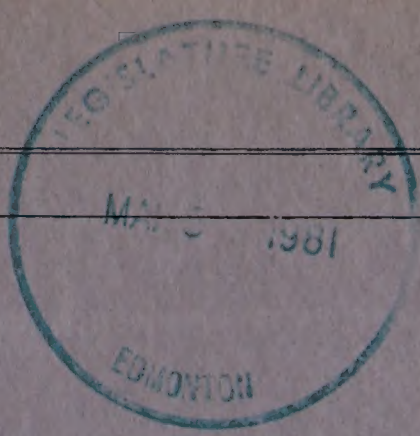


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Oct 1/51  
Vol 13



# The Province of Alberta

## PETROLEUM AND NATURAL GAS CONSERVATION BOARD

IN THE MATTER OF THE GAS RESOURCES PRESERVATION ACT

AND IN THE MATTER of a Joint Hearing to determine various questions  
relating to the proposed Export of Natural Gas from the Province of Alberta.

I. N. McKinnon Esq., Chairman

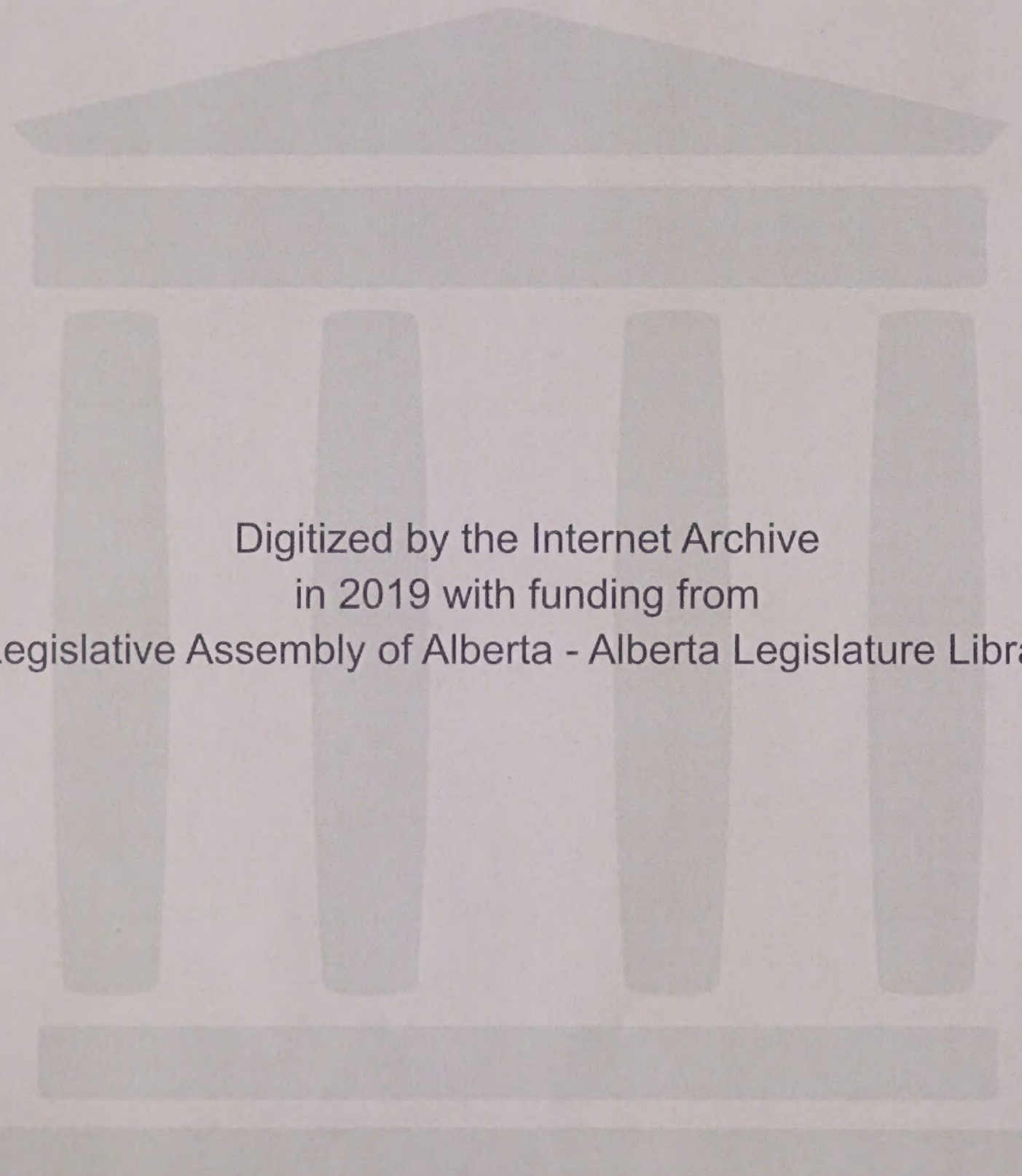
D. P. Goodall Esq.

Dr. G. W. Govier

***Session:***            October 1st, 1951.

**Volume** \_\_\_\_\_ 13. \_\_\_\_\_





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THE CHAIRMAN: Mr.Smith, were you through with your cross-examination of Mr. Herring?

MR. C. E. SMITH: No, I just have a couple of more questions, sir.

.....

ROBERT R. HERRING, recalled, already sworn, cross-examined by Mr. C.E.Smith, testified as follows:-

Q Mr. Herring, will you refer to page 7 of your submission, Exhibit 33?

A Yes, sir.

Q And you say there this, "The plan as illustrated will meet the full requirements of the C.W.N.G. system and the export line on the most economic basis for the local consumer and the producer of the gas. Naturally this will also apply to the local Gas Company and the export Company as well. Without such an export volume the cost of development and transmission would be almost prohibitive to the C.W.N.G. system. As pointed out by the Board and Mr.Ralph Davis 'the Pincher Creek field,' and so on, and then you finish, -

"To a lesser degree of development and operating costs this statement may be applied to the other fields covered in this submission."

If I understand that correctly, it is your opinion, Mr. Herring, that Canadian Western can forget all about these fields if they have got to go it alone?

A No, sir, not at all. The meaning of that, as written, and as I understand it, is to this effect, that there is







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quite some distance between Calgary and those fields, covered in this submission which would necessitate considerable costs in transmission of gas, and it would be particularly costly on an Mcf. basis if it were strictly applied to a peaking base.

Q In other words, is it true that what you do suggest is that they might as well cease interest unless they have the assistance of export as far as these fields are concerned, cost being what it is, or because of the cost.

A Yes, sir, that is my opinion. On the other hand, as they do become very, very short of gas here, then they may work a policy, and may go it alone, and bring such gas in. Our estimate of this is that this plan would afford a 30-year supply for the C.W.N.G. system and the export line. As we have designed it, it is on a basis that it would supply a 30-year requirement.

Q I understand that, Mr.Herring, but what I am getting at is this, if they went and did it alone, the possibilities are that the cost to my furnace would be such that I would switch to coal, is that a fair illustration?

A You might possibly have resource to that.

Q That is what I have in mind. Now, if you will look at Sheet, what is called Exhibit 1 to your Exhibit 33, and referring to the last column, and that is the column of your Prairie Pipe Lines' supply for export peak day?

A Yes, sir.

Q You have 200 million throughout?

A Yes, sir.

Q What I wanted to find out was, where do you get your 200 million, how do you arrive at that figure?

A







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A Well, that is our estimate, or a reduced, somewhat reduced market in the Pacific Northwest, leaving out certain industrial supply which we had estimated in our original submission.

Q What about Ontario? I will put it this way, if I understood your submission, or application, or both, the minimum for what I call Ontario, Eastern Canada. . .

A Yes.

Q . . . was 250 million a day, is that correct?

A That is correct.

Q What connection has that with this 200 million?

A Well, you have presently, you have an export permit for some 40 million a day, leaving a total at the present time of that figure, and that gives us some 240 million that may go into the United States, and our investigations of this problem of reciprocal exchange is such that that would be considered in a volume exchange, if the conditions of export were on that basis.

Q What I am getting at is this, if I understand you correctly, that the need of Eastern Canada under your plan, that there is a need of a minimum of 250 million a day, and I cannot figure on that basis how you get a peak day of only 200?

A This is for the Pacific Northwest, this 200 million a day.

Q Ontario is not considered in this, not in this 200 million a day?

A No, sir.

Q To carry it on a little further, with respect to Ontario, what does the Pacific Northwest need from Alberta before Eastern Canada is served at all?



Well, that is our intention, as a matter of fact, to  
develop markets in the Pacific Northwest, and to  
develop a supply which we can use in the future  
in the event of a shortage.

Q. That is your intention? I will point this out to  
you, that your intention is to develop a supply of  
oil for the Pacific Northwest, and to use it in the  
event of a shortage.

A. Yes.

Q. When you think of this, is it not correct?

A. That is correct.

Q. Now, when you think of this, is it not correct?

A. Well, now, you have an export of oil for

some of the oil in the Pacific Northwest, and you have

some of the oil in the Pacific Northwest, and you have

some of the oil in the Pacific Northwest, and you have

some of the oil in the Pacific Northwest, and you have

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some of the oil in the Pacific Northwest, and you have

some of the oil in the Pacific Northwest, and you have

A. Yes.

Q. That is not correct, is it, that you have

A. Yes.

A. Yes.

Q. That is not correct, is it, that you have

some of the oil in the Pacific Northwest, and you have

some of the oil in the Pacific Northwest, and you have



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A Well, as I explained a moment ago, it is our feeling that 250 million a day would allow us to put in 200 million a day into Ontario, because of this present export to Montana, which would be continued.

Q And what does the export into Montana have to do with it, I do not follow that?

A It is the export into the United States, and by a reciprocal exchange it is our feeling that that amount of volume would be allowed as well.

Q Is that 40 million included in the 250, is that the idea?

A Geneally speaking, yes, sir. The two volumes are approximately the same.

Q Well, I still cannot figure out what you need, what Pacific Northwest needs from Alberta before Eastern Canada can be served under your plan?

A Well, to build an economic pipe line, as we have testified, to Eastern Canada, and to get the gas back there on a competitive basis, we have estimated 250 million a day to that market.

Q Yes?

A Now, if the approximate volume within a very narrow range from Alberta to the Northwest part of the United States is approximately that volume, as established by this figure, plus your present export to the United States, it is our feeling that such is a working solution to thie reciprocal arrangement.

Q If you take the 200 million and you add the 40 million, you feel, if that is the right word, that Eastern Canada could be supplied with gas under your plan?

A I have been informed by our counsel in Washington that







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that can be done.

Q I am not talking about any other person, any counsel, I want to get your own ideas?

A Yes.

Q Now, with regard to the Pacific Northwest, what about anything less than that?

A With anything less than that, as we stated in our submission which has been filed, we would plan a joint service to the Pacific Northwest in that event.

Q And you would need at least 100 million for the Pacific Northwest plan?

A Yes, and our plan is for a large line which will provide for future natural gas as well as meet Alberta requirements, and it is suggested that a volume of 100 million a day would be economic.

Q Well, so much for that. Will you look at Table 1 now with regard to annual export requirements, and if I read this correctly, you have 75.7, 67.7 billion, and in Table 2, if I have the same figure correctly, it is 63.9?

A Yes, sir. I would like to point out what occurred there. The original figures were worked up on the basis of 180 million a day average sales, and we reduced that to 175 million, and the correction was not made on Exhibit 1.

Q So that really that should be changed to 63.9?

A Yes, sir, it should be.

Q That is correct?

A Yes, sir, that is correct.

Q Now, with respect to the question of deliverability schedules, can you tell us how many wells you planned on with regard to these various fields, Pincher Creek, Prin-







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cess-Patricia, and so on? Does it appear in the submission anywhere?

A No, sir, it does not. We have studied each of these fields with that in view, and we do not feel that we can submit a sound program and a detailed program that would be of benefit to the Board beyond that which has been submitted by the various experts in such matters. We do think that our submission on deliverability is considerably below that of others with the exception of possibly Medicine Hat, as presented by the various experts before the Board. And, generally speaking, the number of wells as established in all of those deliverability reports are approximately the same. For instance, Pincher Creek is about 25 wells by most submissions before the Board, and we have borne in mind the deliverability as set up by the various experts.

Q When you say "the various experts", is there any one of them to which you would like to draw the Board's attention and say that you more or less agree with him as being a sort of Number 1?

A The submissions by Ford, Bacon & Company, by DeGolyer & MacNaughton, and the submission by Dr. Brokaw.

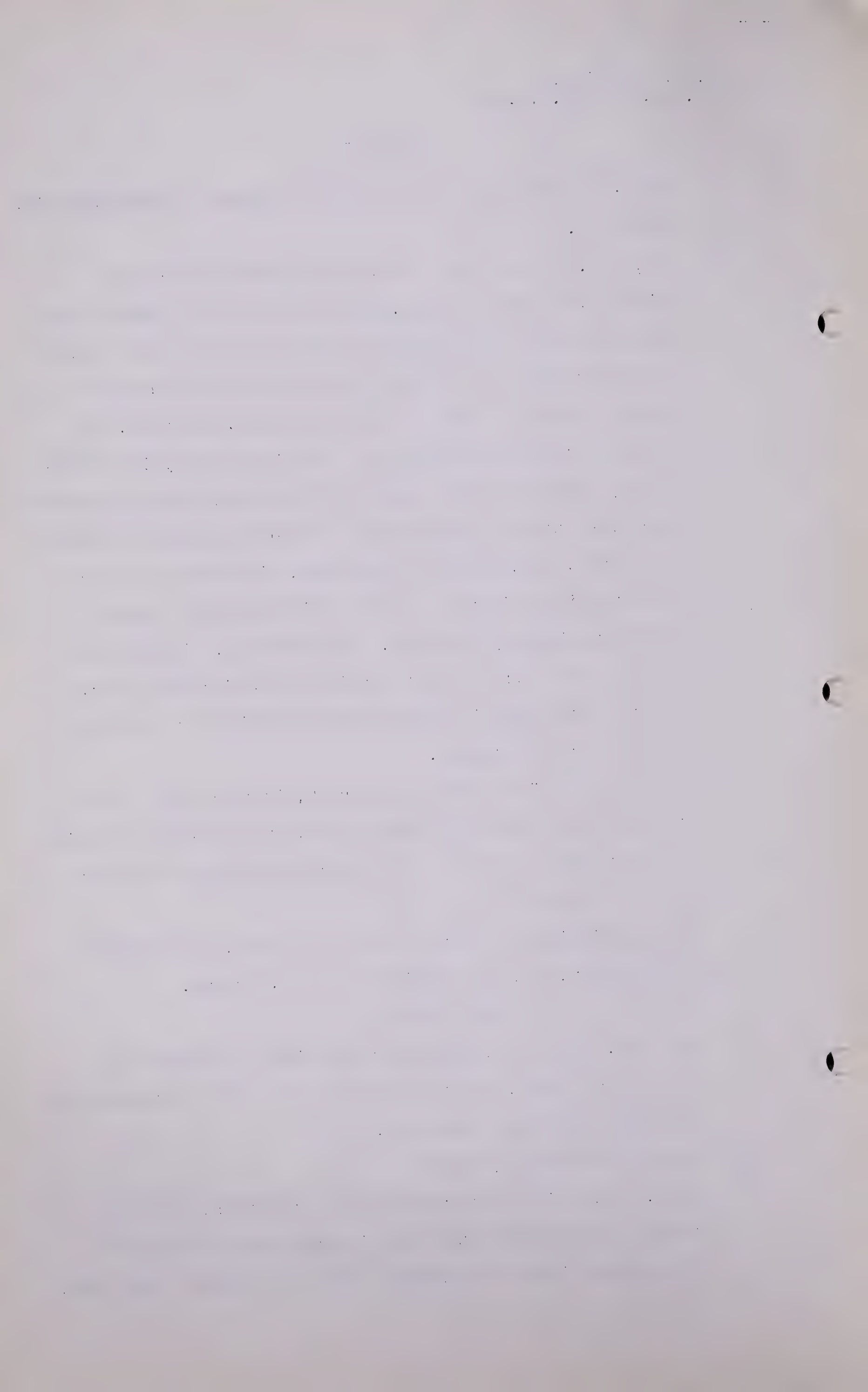
Q They are not all identical?

A No, sir. They will, generally speaking, be related to one or the other, and there will be not much difference in the deliverability estimates.

Q What do you mean by that?

A Well, there will be a considerable variation, but with regard to the deliverability, in applying a program to the problem inside of Alberta and to the export pipe line,







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all the various fields have been utilized and have been covered in those submissions, and it is on a basis which, in our opinion, would meet those requirements, and then the withdrawal rates and everything else from the field will reflect the deliverability, giving the number of wells drilling, and the economics of drilling those wells.

Q In any event, you have nothing to give to the Board now having regard to your own submission, with respect to your own plan, having regard to the number of wells in each field?

A No, sir.

Q One other thing, Mr. Herring, With regard to Pincher Creek, on the open flow, did you use 52 million or 83, or what?

A On?

Q Pincher Creek?

A Well, sir, as I just stated, we have not estimated by evidence before this Board the basis of individuals well performances there. We have accepted Gulf's statement as to what is their desire to produce that field, and the testimony by various experts.

Q When you say you have accepted Gulf's statement, that is something you have heard?

A We have discussed in detail with Gulf with regard to it. However, they testified last Fall with regard to their recommendation for the production of that field.

Q And is there any information that you expect to be given here when they are called again, maybe this morning or tomorrow?







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Cr. Ex. by Mr. C. E. Smith.  
Cr. Ex. by Mr. Nolan.

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A No, sir. I am not familiar with what they plan in the way of testimony.

Q You have not anything with regard to Pincher Creek?

A No, sir.

Q All right, I think that is all.

.....

CROSS-EXAMINATION BY MR. NOLAN:

Mr. NOLAN: Mr. Chairman, arising out of a question that I asked Mr. Herring on Thursday, perhaps you will permit me to clarify as to what happened on that occasion. I am looking at page 1073 of the transcript, Mr. Chairman.

THE CHAIRMAN: Yes.

Q MR. NOLAN: Mr. Herring, I am looking at page 1073 of the transcript, and we were discussing an agreement made between your company and the El Paso Company to obtain Texas gas and trans-ship it to Ontario, and I was asking you about the agreement, when it was made, and you said in July, but you did not know the date, and I said to you, "Do you know the date? A. No, sir, I do not have the contract or the letter of contract with me." Now, when I came to read that transcript, Mr. Herring, I was not quite clear what you meant when you said "The letter of contract"?

A Well, I would like to clarify that, too, Mr. Nolan. It is a contract in the form of a letter with many terms which could not be put into the form of a formal contract whatsoever. As I said it the other day, we have the right to vary at the present time from 200 million cubic feet a





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day to 350 million cubic feet a day. This was covered in this generalized letter of agreement.

Q Now, who wrote the letter and to whom was it addressed?

A Oh, Mr. Fish of our company and Mr. Paul Kaiser of the El Paso Company made this agreement.

Q But it is a letter?

A Yes.

Q Well, that means that it was transmitted from one person to another, does it not?

A That is right.

Q Well, who wrote the letter?

A From the El Paso Company to the Pacific Northwest Pipe Line Corporation.

Q El Paso wrote to the Pacific Northwest Pipe Line?

A Yes, sir.

Q And was there any reply from the Pacific Northwest Pipe Line to El Paso?

A Only verbal.

Q And who made the verbal reply?

MR. S. B. SMITH: Excuse me just a minute. I think I made my position plain with regard to this matter when Mr. Nolan was examining on Thursday when he asked for the production of the formal contract. I took the position then that I had had no previous request for it, and I then said I would want to consider our position whether we would or whether we would not produce the document. As I understand it, the Board at that time intimated that I would be given time to consider our position about this. I have not had any additional time to consider it. I did not know





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that Mr. Nolan intended to go into it any further this morning. If Mr. Nolan is going to cross-examine as to the detail, then the position with regard to it will have to be given consideration. The document is quite vital, the written document, if he wishes to get all the details from this witness. I do not know as to its relevancy at this time. I am not refusing to produce it, and did not refuse to produce it the other day, but I would like to have an opportunity of considering our position. Mr. Nolan last Thursday intimated that he had no objection, as I understood him, to me being given the opportunity to consider my position, and that it would be quite satisfactory to him if I made my position plain with regard to it later on, which, I understood to refer to the second phase of these Hearings, and not this Monday morning.

MR.NOLAN: Well, Mr.Chairman, it seems to me that the whole cornerstone of the case for the Prairie Company is based upon the existence or non-existence of a legal and binding contract to obtain gas from the El Paso Company. For that reason I think that the Board should have that information, and I do not think that there should be any reluctance on the part of Prairie to provide the Board with the information contained in whatever it is, the letter passing from El Paso to Mr. Fish, and the verbal reply from Mr. Fish to El Paso. Now, the Board addressed a question to Mr. Smith, counsel for Prairie, on Thursday, and that appears at page 1074, and the Board asked him if he intended to file the contracts, or the contract, and Mr.Smith said that he wanted some time





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to consider the position. He, of course, says this morning that he had no notice that this request was going to be made. Well, of course, you could not expect to have notice of something that came out in evidence on Thursday, because that was the first that we had learned of it. However, I do say, Mr. Chairman, that it is very important from the point of view of my clients, and the other applicants, that the Prairie Pipe Line Company come before this Board and place before it the contract which they say they have with the El Paso Company. The rest of us have done that without any reluctance on our part, and we think that Prairie should be asked to do what the rest of us have done willingly and voluntarily.

MR. S. B. SMITH: Well, sir, so far as the cornerstone of our case is concerned, we will state what the cornerstone or cornerstones of our case are in due course. We do not need to depend on Mr. Nolan to tell the Board what the cornerstone is, or what the cornerstones are. The part referred to occurred to on page 1074, when I took exactly the same position as I do today, and Mr. Nolan said "That is perfectly all right, Mr. Chairman, as long as Mr. Smith gives it consideration before we break up." That is Mr. Nolan's language. At page 1075 the Chairman said,-

"Would you like to defer that question until we do adjourn when we are going to discuss the matter of contracts?"

and I took it, sirs, that you were then referring to the second phase. Mr. Nolan said,-





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"Yes, there is no immediate rush about it as long as the information is provided to the Board."

My position is entirely consistent. Mr. Nolan has conjured up this idea of reluctance. I leave it to the Board to say whether there is any reluctance on my part or not. That is his language, and I suggest it is quite unjustified.

MR. C. E. SMITH: I wonder, Mr. Chairman, might I intervene for a moment, and get into this thing?

THE CHAIRMAN: Yes.

MR. C. E. SMITH: But it seems to me that the situation is this, that if it is to be something that the Board should see, as Mr. Nolan suggests, and Mr. Smith decides he is not going to show it to them, surely it is a matter of possible lack of proof, if this Board so finds, and I would suggest that it be left as it is, and if the Board finds that Mr. Smith has not given you something here, then it may work to the advantage of Mr. Nolan and the other applicants, but I do not think the Board should at this moment say that you wish to see this particular contract. As a matter of fact, all applicants have not shown contracts, as far as I understand the situation here. I think it could well rest, Mr. Chairman.

MR. S. B. SMITH: In addition to what Mr. Smith has said, as I understand it, we are not dealing with contracts at all at this stage of the Hearing, at this Sittings, and if my memory is correct, there has not been any evidence put in, contracts by any company, or





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the Northwest Company that Mr. Nolan represents.

MR.NOLAN:                   There has been evidence given  
by the Northwest.

MR. S. B. SMITH:           Not at this sittings.

MR.NOLAN:                   No, because we gave it before,  
and we do not see any necessity to repeat evidence we  
gave before.

MR.S. B. SMITH:            You gave evidence before about  
contracts, or some of them, but that was a long time  
ago.

MR.NOLAN:                   All I want, Mr. Chairman, is to  
be assured that there will be produced before the Board  
a letter written by the El Paso Company to Mr.Fish, in  
order that we might know whether or not the Prairie Com-  
pany has any gas.

MR. S. B.SMITH:            In answer to Mr. Nolan, sir,  
I think I made my position quite plain. I want some  
time to consider this matter, and I am not giving Mr.  
Nolan any assurances of any kind.

THE CHAIRMAN:              Mr. Nolan, we will let this  
matter rest until the adjourned Sittings, as I think you  
agreed to do.

MR.NOLAN:                   That is quite all right. I  
have given notice of motion now.

(Go to page 1106).





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Exam. by Mr. C.E. Smith.

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Q I wonder, sir, and I hate to start this again, there was a question I omitted and I would like permission to ask Mr. Herring just one question. Page 1070 of the transcript, is it before you, Mr. Herring?

A No, sir.

Q The second sentence at the top of the page you say this:

"The applicant desires to emphasize the fact that its agreement with Pacific Northwest Pipeline Corporation must be completed before that company initiates the construction of its all Texas line to the Pacific Northwest."

Having regard to the word "agreement" there, are you referring to an agreement between Prairie and Pacific Northwest to supply some or sufficient gas for the reciprocal arrangement with Eastern Canada?

A Yes. We have this agreement which supports all these presentations we have made with reference to gas from Alberta.

Q And when you say:

"The applicant desires to emphasize the fact that its agreement with Pacific Northwest Pipeline Corporation must be completed before that company initiates the construction of its all Texas line to the Pacific Northwest,"

I do not just quite follow that.

A well, sir, this Board is familiar with the fact that we have offered contracts to the market in the Pacific Northwest for the completion of the gas from Texas to the Pacific Northwest. At the present time, our price





R. R. Herring,  
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is approximately 5 cents per 1,000 cubic feet more than they have been assured that the price would be from Alberta, at least, by various engineering firms. Now, on that basis, we are not going ahead with the Texas project until such time as those contracts can be completed. At the present time the market is anxious to get gas from Alberta if at all possible. If something should transpire which will allow us to go ahead with that contract, we are anxious to do so.

Q Let me put it in figures. To me this statement means this, unless you get a permit to export at least 200 million cubic feet, as suggested some place else, then you do not get an agreement with Pacific Northwest with regard to them supplying Eastern Canada and then they do not build a line to the Pacific Northwest, am I right in that?

A No, sir. I state in the last page of the submission of last Thursday that in submitting the recommendation of the Prairie companies we in no way change our previous applications to the Board in which we agreed to take any of that volume from 100,000 to the full requirements of the Pacific Northwest market.

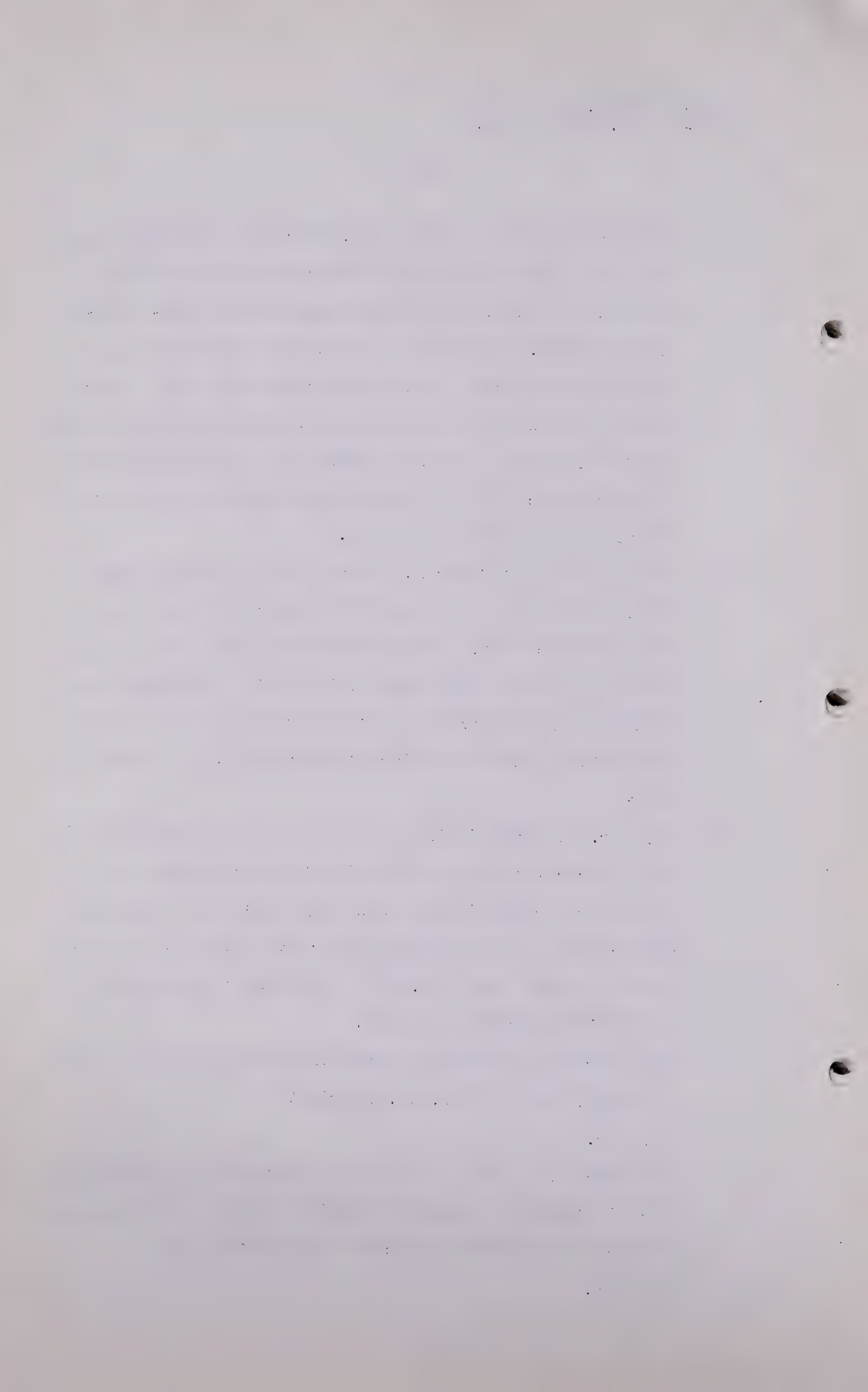
Q What struck me was this sounds in itself as if there was a change, that is all, Mr. Herring?

A No, sir.

Q It struck me if you do not get enough gas to arrange that Pacific Northwest supply to Eastern Canada, then the line of Pacific Northwest would not be built at all?

A No, sir.





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Cr. Ex. by Mr. McDonald.  
Exam. by Dr. Govier.

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- Q That seems to be what this states, in any event?
- A No, we do not mean that, Mr. Smith.
- Q I am glad you cleared it up because I was just trying to figure it out, Mr. Herring.

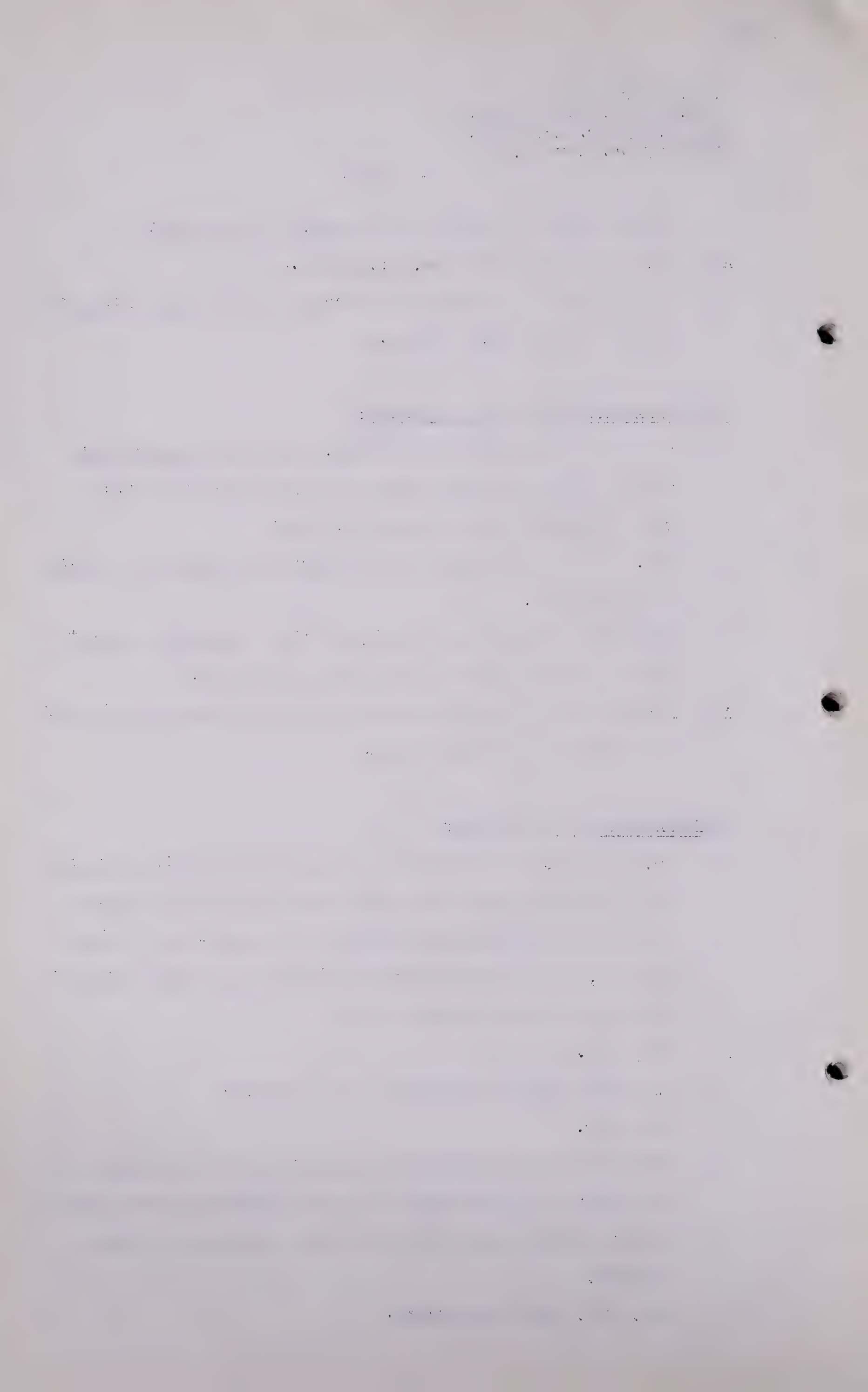
CROSS-EXAMINATION BY MR. McDONALD:

- Q As I understand it, Mr. Herring, you have revised your total demand from the submissions you made last fall when you got down to your 63 billion?
- A Yes. We cut out considerable industrial market in coming to that total.
- Q What was the general locality of that industrial market which you cut out of your previous estimate?
- A A portion of it is in the Spokane Valley and a portion of it is out on the West Coast.

EXAMINATION BY DR. GOVIER:

- Q Mr. Herring, it may just be because it is Monday morning but I still do not quite understand some of the figures you have presented with respect to volumes. Am I right in this, that your application is for any amount greater than 100 per day on the average?
- A Yes, sir.
- Q Up to 250 million per day on the average?
- A Yes, sir.
- Q And that your deliverability program given in Exhibit 33 is really an illustration using the figures of 175 million per day average and 200 million per day peak, is that correct?
- A Yes, sir, that is correct.





R. R. Herring,  
Exam. by Dr. Govier.

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Q The 175 and the 200 reflect a load factor of  $87\frac{1}{2}$  per cent, Mr. Herring?

A Yes.

Q That seems rather large. Can you explain how that can be arrived at?

A Yes. Of course, the economics of a pipe line operation improves as the load factor improves. At the present time, the El Paso line is operating at about a 92 per cent load factor by use of storage on the West Coast. We propose to maintain as high a load as possible by the use of interruptible industrial customers. We are told we can maintain this 80 to 85 per cent load factor.

Q For the entire market amount, is that correct?

A Yes, sir.

Q Including the amount that may come from Texas?

A With the Texas line we think we can approach a 90 per cent load factor and the reason for that is a very large sugar beet load in Idaho which lasts for the four summer months.

Q And that would be accomplished both by the use of interruptible loads and by the use of storage near the market?

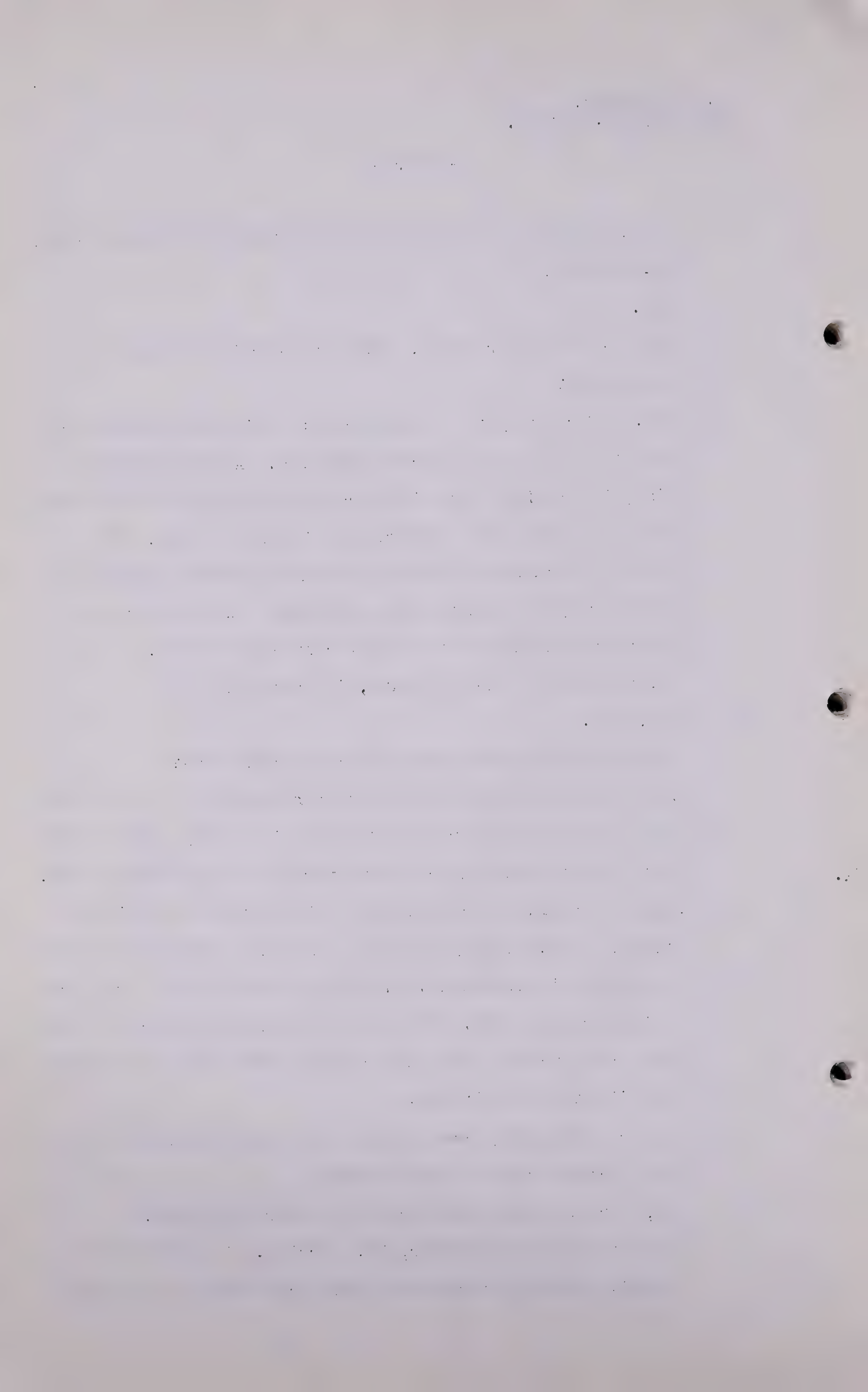
A If storage is available. We have no plans which are firm at the present time. We have surveyed one particular site but until actual tests are carried out there is no assurance it will be suitable.

Q You are reasonably certain one way or another those high load factors can be accomplished?

A Yes, sir, by our experience with other pipelines.

Q There is one other matter, Mr. Herring. You stated last Thursday that you agreed with and accepted the estimates





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of DeGolyer and MacNaughton in respect to reserves. I think that is right?

A I specified proven in that.

Q The proven?

A Yes, sir.

Q That is what I was going to ask. Why was it with the exception of two fields you used only the proven reserves in your deliverability schedules?

A Well, we tried to limit this presentation to actually proved areas to make certain that our presentation was within the limits of possibility to the Board and a basis that they can be sure of. Now then, in those two fields which we varied from that, as stated on Thursday, we tried to keep a margin above that in other fields such as Pincher Creek, Cessford and Medicine Hat, which would protect any area in those two fields.

Q So that in the over all the volumes of gas you are assuming are less than the total of the proven amount for the two fields?

A Yes, sir. Now, the only questionable item in our amounts on this deliverability schedule is that of Medicine Hat where we use an eventual peak of 100 million a day for two years, during the last two years of the export line take, . On the other hand, the new developments covered some 262 sections. We think it may require a great amount of compression at that time to get that deliverability. So we think it is well within the realm of possibility at that time. It would in the early years severely hurt the field undoubtedly. At that time we





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do not feel that it would, but if we are incorrect in that we have this margin established throughout those other fields, taking Pincher Creek at 125 million a day peak. Of course, the field is able to exceed that. If you had a limiting factor on the gasoline plant you could still exceed that by 20 per cent. You lose efficiency but you can throughput on specific days.

Q Did you omit DeGolyer and MacNaughton's probable gas on the grounds that you were a little less certain of its existence than you were of the proven gas?

A No, sir. Well, yes, sir, I do not mean to apply this on the same grounds as proven. Doctor, I would not try to put myself in the position of being able to select that which is proven and that which is probable from the definitions but I would go this far, as an engineering firm and as a firm which has done considerable financing through this type of project, worked and watched the insurance companies in the United States study these reserves, and, of course,  $3\frac{1}{2}$  million dollars have been advanced by those insurance companies through the last six years of natural gas pipelines in the States. On that basis, Mr. Davis, DeGolyer and MacNaughton and others, their proven is accepted and a percentage of their probable. In some cases on the Gulf Coast some 75 per cent of the probable has been accepted.

Q When you say "accepted", you say accepted by banking houses?

A Yes, sir. I would like to qualify that, sir. The Federal Power Commission requires 10 billion of reserves for





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1 million of daily delivery. On that basis, 7 billion 300 million would be required for a 20-year base so this is extended some 27 years and 20 years to pay out. Even though they accept 75 per cent of the probable, they none-the-less have extended this particularly by production in that extra 7 years.

Q That is the provision for peak days?

A That is on the contract volume, sir. If they can maintain a full value of that volume, say they use the billion, it will have a daily volume -- Trans-Continental is maintaining between 90 and 95 per cent except for mechanical difficulties, which will be overcome.

Q would you suggest, then, that the Board in considering probable reserves should apply a discount factor as a banking house would?

A Yes, sir, I think there is no doubt about that.

Q You mentioned that discount factor in one case was 75 per cent. Could you give us any other factors?

A I meant by that, 25 per cent discount, 75 per cent of the probable.

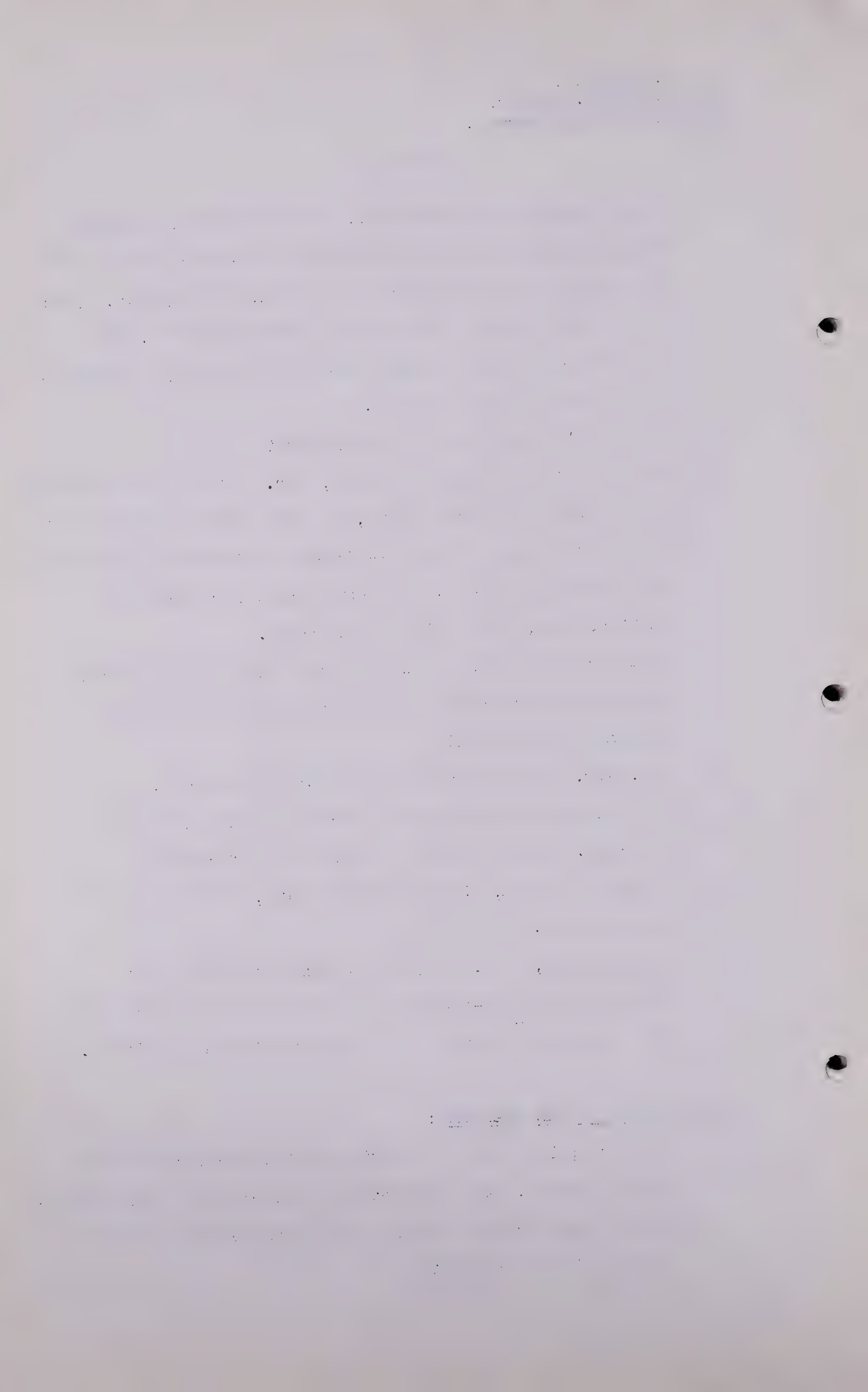
Q I meant that, too. Do you have any other figures?

A Only this rule-of-thumb of the Federal Power Commission of 10 billion reserves to 1 million of daily delivery.

EXAMINATION BY THE CHAIRMAN:

Q I am not quite sure yet about this 250 million in this Eastern market. As I understood your application, originally it was for 100 million feet on an exchange basis with gas in the States?





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A Yes.

Q Do I understand you correctly now that if you are given 200 million feet per day that you would supply the B.C. market plus 250 million per day to the Eastern?

A Yes, sir. Now, as you know, in those Eastern Provinces they have had difficulty in getting gas across from the U.S. side because of the demands of the various U.S. Utilities. The group in the Northwest are such a close unit, Vancouver, Seattle and Portland, they have stated to us that there would never be any difficulty in including Vancouver in the Northwest market. However, the thing we emphasized there is that in our proposal we presented to the Board there was service to a Canadian market. We think this reciprocal exchange can be worked on the basis of 200 million to us on the present export that is taking place and approximately 250 million a day into Eastern Canada, and Vancouver will still be served as part of the Northwest market.

Q In effect, it would not be a straight exchange. With the gas being sent to the Vancouver market it would be in our favour. In other words, we would be giving you 250 million feet per day, you would supply 200 million to the Eastern market and 100 million feet per day to the British Columbia market?

A I would qualify that to this extent, sir. If the demand for your export license did not include a specific dedication, on that basis it would not. I do not presume to out-guess our Federal Power Commission, but unless the Board's export permit called for such a dedication, then





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I assume it would not be on that basis. Now, if we carry out a joint service to the Pacific Northwest from Texas and from Alberta, then we could have afforded to dedicate a certain percentage to Vancouver. Even without a dedication we feel Vancouver will never be without service.

Q You think the Federal Power Commission will let you supply the 250 million cubic feet to Eastern Canada even though 100 million feet a day will be supplied to Vancouver?

A As long as there were no serious objections raised by the U.S. section of the Pacific Northwest market against that Vancouver service.

Q MR. S.B. SMITH: In other words, as I understand it, your view is that Vancouver for those purposes would more or less be considered a part of the Pacific Northwest area?

A Very consistent with Mr. Howe's letter of last fall in which he counted on the same thing.

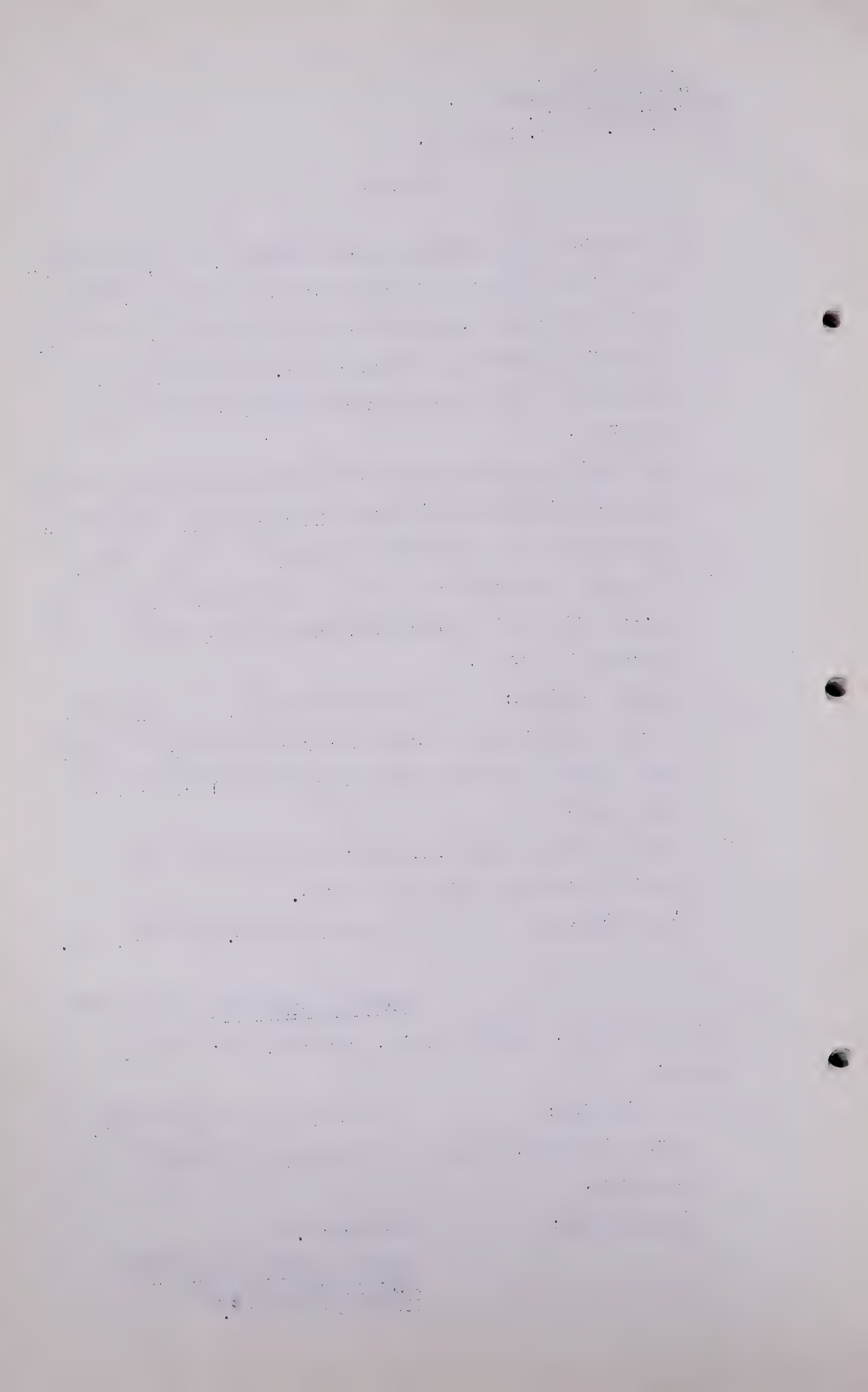
MR. MARTLAND: I am calling Mr. Hawthorn, sir.

DAVID G. HAWTHORN, having been first duly sworn, examined by Mr. Martland, testified as follows:

MR. MARTLAND: I am tendering as an exhibit, sir, this brief. Copies have already been supplied to the Board.

THE CHAIRMAN: Exhibit 24.

BRIEF ON BEHALF OF WESTERN  
PIPE LINES PUT IN AND  
MARKED EXHIBIT 34.





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Q MR. MARTLAND: Mr. Hawthorn, you have appeared before this Board on two previous occasions?

A Yes, sir.

Q On the first occasion you submitted as Exhibit 6 in the western Pipe Lines hearing an analysis of the natural gas reserves and deliverabilities in the Province of Alberta?

A That is correct.

Q And then at the Joint Hearing about a year ago you submitted Exhibits J-22 to J-25 inclusive?

A That is correct.

Q And those comprised the proposed gas supplies for Western Pipe Lines, an analysis of the deliverability characteristics for that proposed gas supply for Western Pipe Lines, delivery characteristics of the gas supplies serving Canadian Western Natural Gas Company and Northwestern Utilities, and then a study of the more important discoveries in the year 1950?

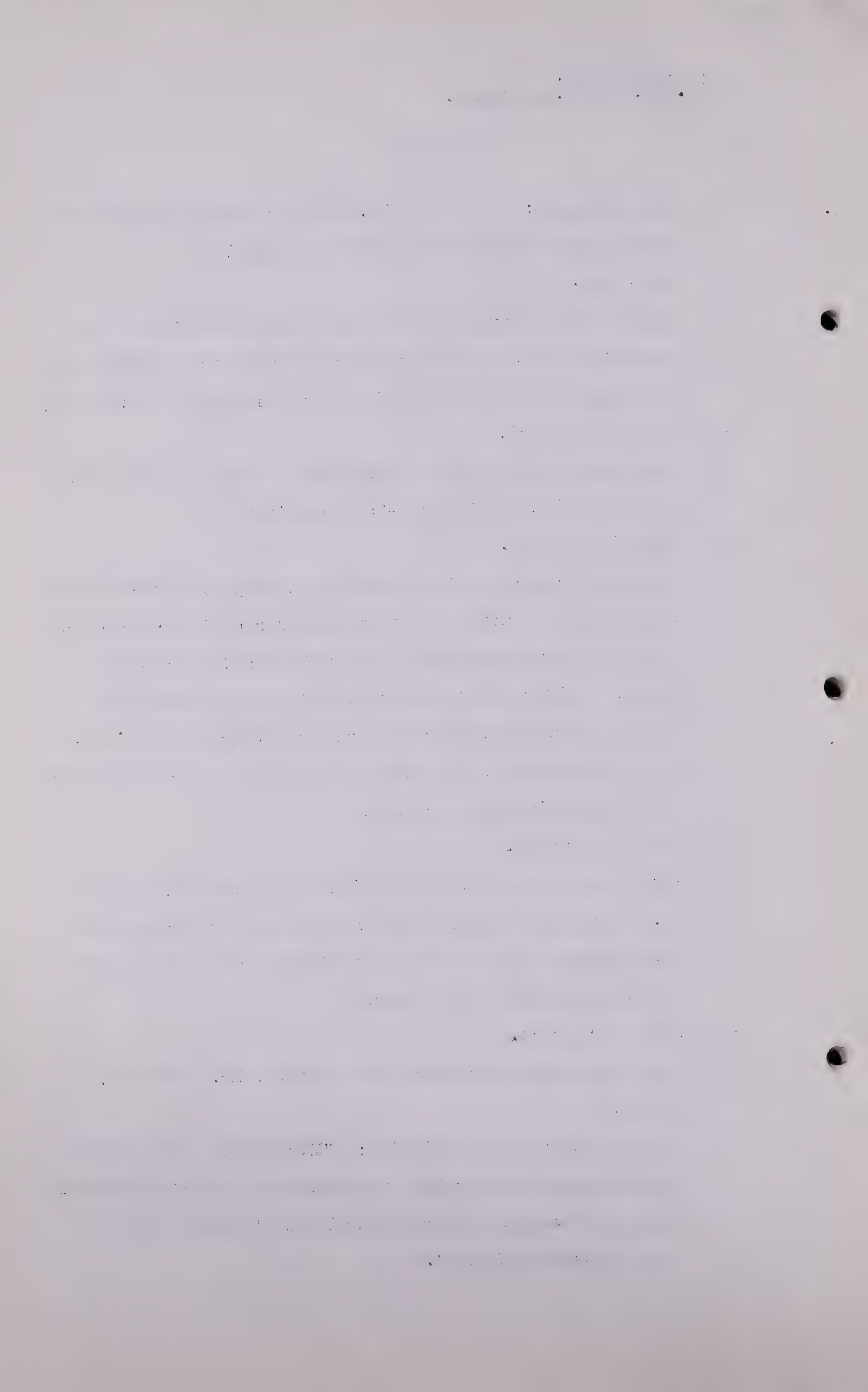
A That is correct.

Q And I understand that the exhibit now tendered, Exhibit 24, represents a study made in the light of subsequent developments following the Interim Report of this Board on January 20th of this year?

A That is correct.

Q Would you now mind reading the exhibit, Mr. Hawthorn, please.

A I have titled this submission: "Marketable Gas Reserves and Estimated Deliverable Quantities to meet the requirements of Canadian Western Natural Gas Company Limited and Western Pipe Lines".



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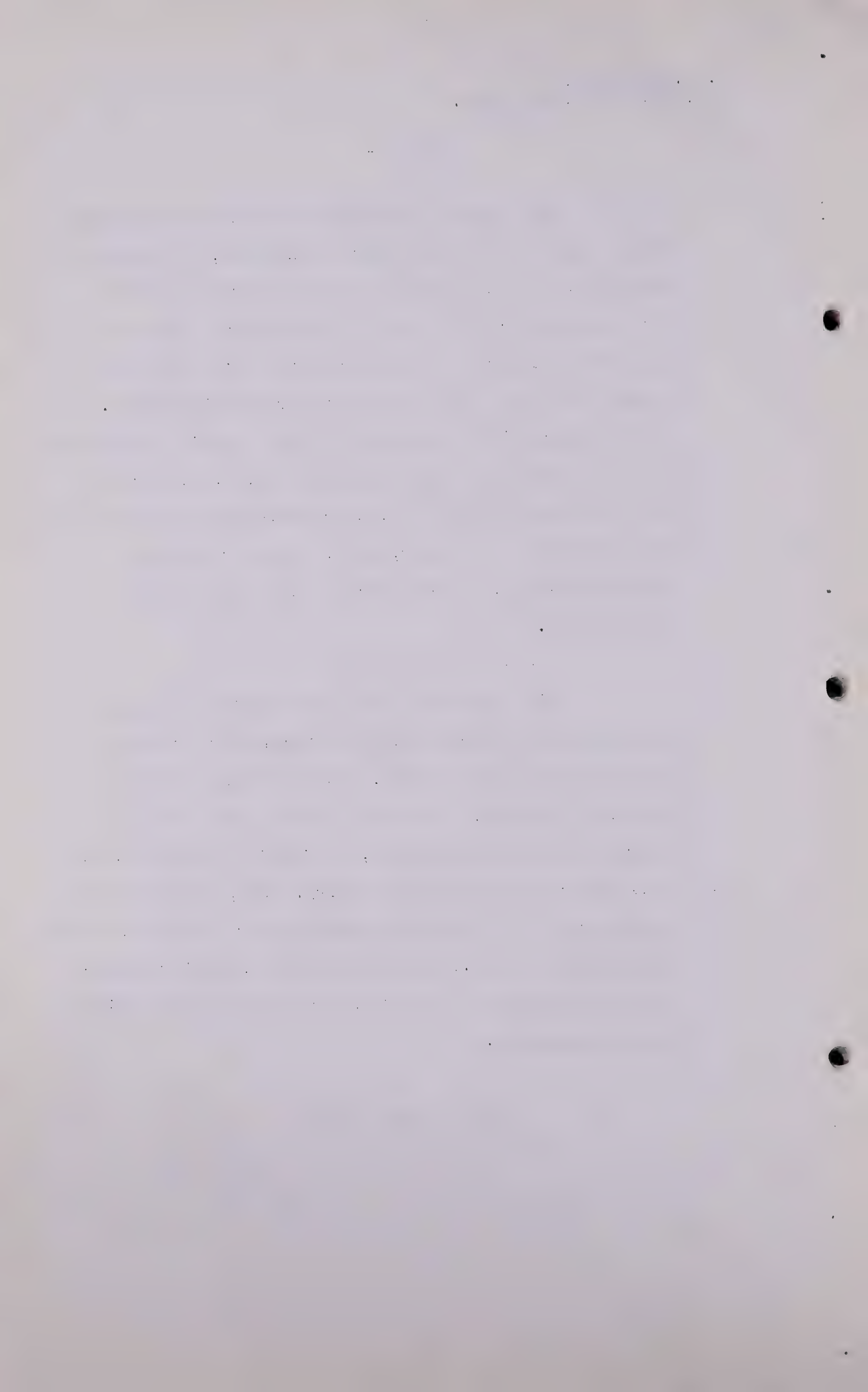
This report is submitted to the Petroleum and Natural Gas Conservation Board of Alberta, as further evidence in the application of Western Pipe Lines for permission and certification to export gas from the Province of Alberta to serve markets to the east in Saskatchewan and Manitoba and in Northern Minnesota. It is prepared in accordance with the Board's willingness to open hearings starting September 10, 1951, for the purpose of receiving new evidence developed since the last sessions in November, 1950, on gas reserves, deliverabilities, and Provincial and export market requirements.

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This submission deals with new gas reserves which have been discovered and developed in southern Alberta since last November, and the manner in which these new reserves, when added to the established gas reserves of southern Alberta, as found by the Board in their Interim Report dated January, 1951, constitute a fulfillment of 30 years requirements for Canadian Western Natural Gas Co. Ltd., and Western Pipe Lines' requirements for 20 years as set forth in previous submissions by this Applicant.

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Throughout the report and the analyses which have been made, the findings of the Board as presented in their Interim Report have been recognized and adhered to. The work has been aimed, as nearly as possible, at answering the Board's conclusions concerning the established gas reserves in Southern Alberta and the requirements of Canadian Western. In this respect, the Board's conclusions concerning Southern Alberta have been taken to be the expression made in the following paragraph taken verbatim from the Board's report:

" What seems to be needed is the development of some further dry gas reserves, the planning of a future peak sharing storage project, and the integration of the dry gas reserves, the storage scheme and Pincher Creek to meet jointly the requirements of the C.W.N.G. System and some export market proportionate to the increase in reserves."

Other parts of the Province have not been considered in this submission inasmuch as the problem of reserves and requirements has assumed such a natural geographical and proper separation. The Board has identified the Canadian Western Natural Gas Company System and the problem of gas reserves and deliverable quantities in Southern Alberta. It has also set apart and clearly identified the Northwestern Utilities System and the problem of gas reserves and deliverable quantities in the Edmonton area. This has





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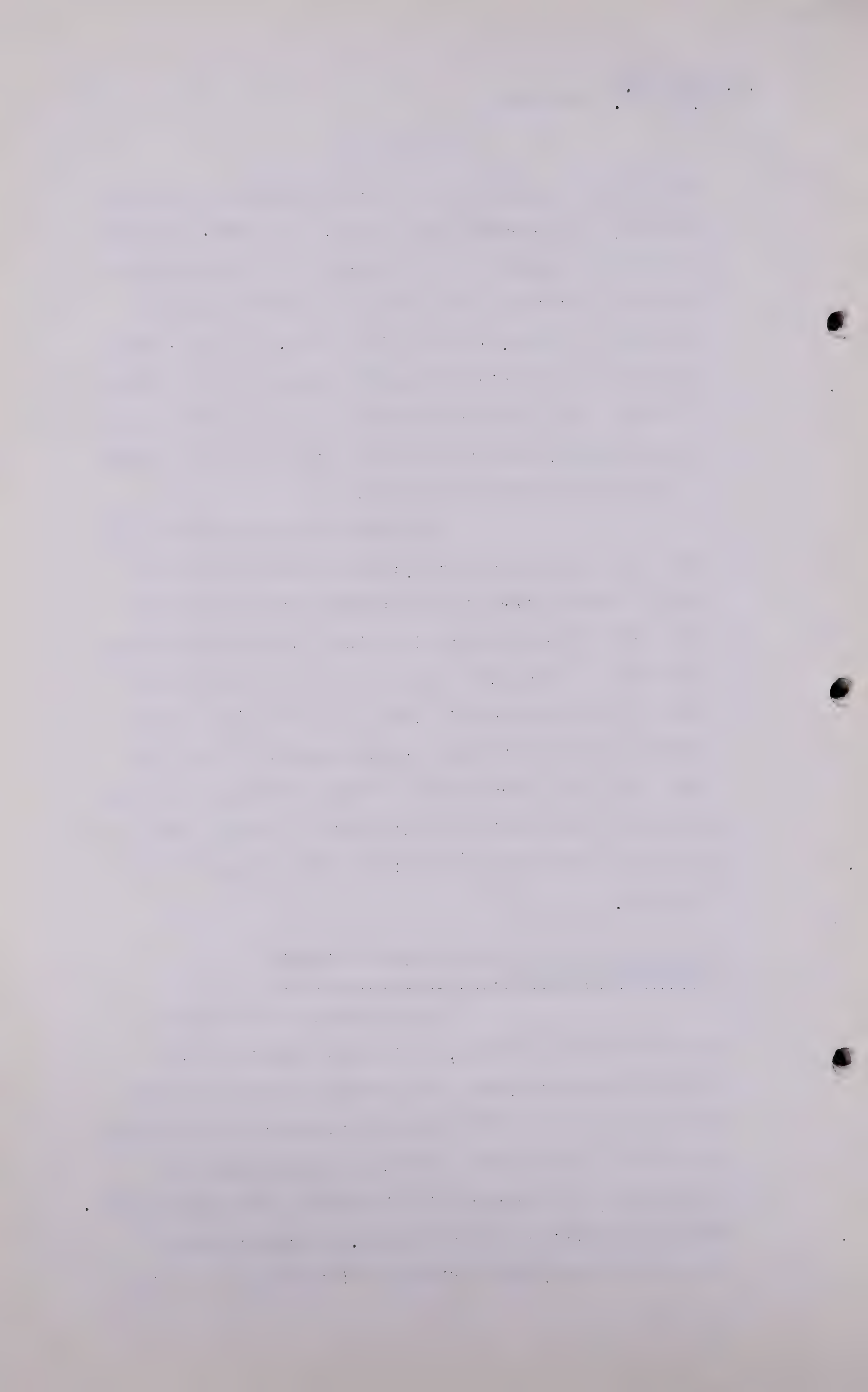
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been taken to mean that the Board is agreeable to considering, with certain limitations, of course, that the proposition consists of two separate and distinct problems and individual answers may be satisfactorily developed for each. For the time being, at least, this seems to be a practical approach inasmuch as both areas are about on a par with respect to gas reserves and each area is progressing at about the same rate with respect to discoveries and developments.

Furthermore, this submission has been restricted to the gas problems in the southern part of the Province for the reason that this is the area from which Western Pipe Lines plans to obtain its gas supplies when quantities of gas are available for ample protection for this part of the Province and for Western Pipe Lines' export requirements. It has been felt that other parts of the Province would be able adequately to meet their respective gas problems and be self-sufficient and independent of the southern part of the Province.

Established Reserves and Deliverabilities  
Versus Requirements.

The following is an analysis of established reserves, deliverable quantities, and Provincial requirements for southern Alberta as found by the Board in its Interim Report, combined with Western Pipe Lines' requirements and new reserves which are evidenced by the past year's discoveries and developments. Without resorting to details now, but merely through the use of a few basic findings of the Board and other



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general considerations, an attempt is herewith made to demonstrate that the gas reserves of southern Alberta, and deliverable quantities to meet peak demands are approaching if not equal to a full 30 years' requirement for C.W.N.G., and a full 20 years' requirement for Western Pipe Lines.

The Board has found that about 4-1/2 trillion cubic feet of marketable gas will be needed to supply 3 trillion cubic feet for Provincial requirements and at the same time have the capacity continuously to meet peak day requirements.

The Board has found that 1,735.2 MMMCF to 1,935.2 MMMCF, or an average of 1,835.2 MMMCF of gas will be required to deliver 1,239.6 MMMCF of gas to the Canadian Western System over the next 30 years and simultaneously to meet peak day requirements.

The Board has found that 2,179.2 MMMCF to 2,379.2 MMMCF., or an average of 2,279.2 MMMCF of gas will be required to deliver 1,553.6 MMMCF of gas to Northwestern Utilities System over the next 30 years and simultaneously meet peak day requirements.

All of these figures are in the ratio of 3 to 2. This means that 1-1/2 times as much marketable gas must be available in the ground as is necessary to deliver to market over a period of time and continuously maintain the peak day requirements experienced in serving Alberta markets. Conversely, it can be expressed that with a given reserve of marketable gas in the ground that 2/3 of this quantity can be





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deliverable over a period of time and at the end of this period still have 1/3 of the marketable gas reserve left in the ground with delivery capacity adequate to meet peak day demands.

On this basis the following analysis is made:

	Requirements <u>MMMCF</u>	Marketable Gas Required in the <u>Ground MMMCF</u>
Canadian Western	1,239.6	1,835.2
Western Pipe Lines	<u>1,127.5</u>	<u>1,692.0</u>
	2,367.1	3,527.2

The Board has found that over the next 30 years the fields of Turner Valley, Jumping Pound and others presently connected to the Canadian Western, can deliver 635.2 MMMCF of gas to the system. The Board has also found that an established reserve amounting to 1,589 MMMCF exists in six other fields in southern Alberta. It is understood that 45 MMMCF of gas is now committed to Montana Light and Power Company from the Pendant d'Oreille field, thus leaving an available reserve of 1,544 MMMCF. Adding this to the quantity of gas estimated to be obtainable from the fields now tied to Canadian Western, gives a total available reserve of 2,179.2 MMMCF of marketable gas. Thus, a reserve of about 2,200 MMMCF of gas is now available to meet the projected requirements of the two systems of about 3,500 MMMCF of gas, which includes capacity to meet peak day requirements throughout the period.





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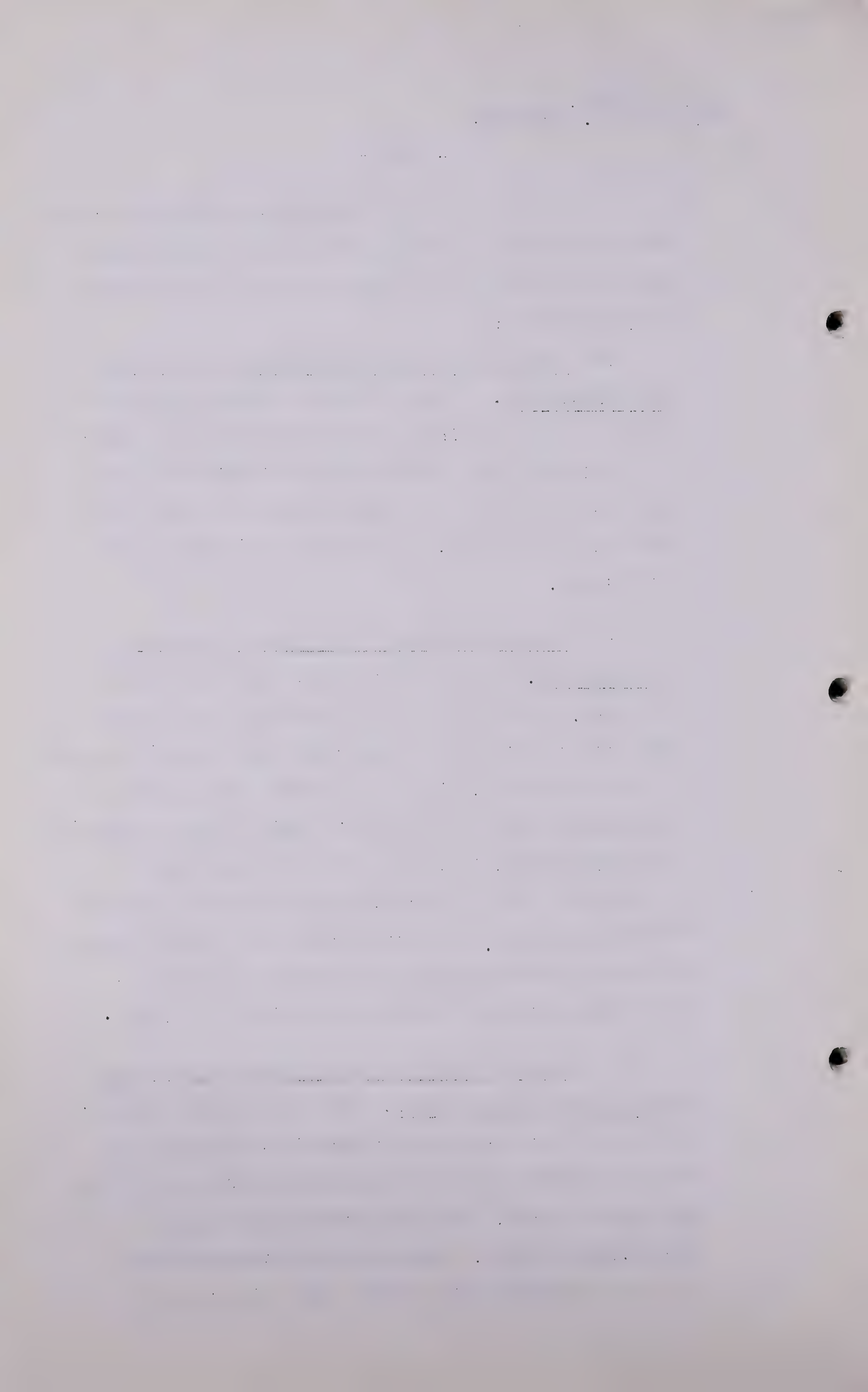
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The observed deficiency of 1,300 MMCF necessary to meet all of Canadian Western's and Western Pipe Lines' requirements can be met in several ways, as follows:

(a) Newly discovered and developed reserves in Southern Alberta. It goes without saying that this is the most important single source of additional supply. It is believed that a conservative estimate for newly developed reserves in southern Alberta is in the neighbourhood of 800 MMCF. This will be discussed more fully later.

(b) The establishment of a larger reserve at Jumping Pound. The hope of this has been expressed by the Board. Also there is the drilling of more wells that will facilitate a speedier and more economic recovery of the gas reserve. It is believed the efficiency of recovery as shown in the Board's deliverability analysis of Jumping Pound, is low and that more gas needs to be taken out faster to provide a satisfactory operation for the operators. These two conditions combined could provide an additional 200 to 300 MMCF of reserves, recoverable within the projected period of 30 years.

(c) Greater reserves than estimated might become available at Pincher Creek. Gulf has admitted conservatism in their treatment of porosity. The Board has attached further conservatism in their treatment of the shrinkage factor. The two combined might spell ultra-conservatism. Relaxing conservatism somewhat to a more liberal point of view makes it entirely



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possible that Pincher Creek would ultimately produce 300 to 500 MMMCF more gas than the Board's recognition of 1,170 MMMCF.

(d) The Ultimate establishment of greater reserves in any of the other fields referred to. Admittedly, the Princess-Patricia area has been difficult to evaluate and estimates have ranged all the way from nothing to several hundred billion cubic feet of gas reserve. In situations of this kind, the accepted figure is likely to be on the low side. Further than this, none of the fields have received what can be termed development drilling. When this takes place, it can be expected that extensions to the fields and other productive horizons will be found that will supplement and increase the reserves as we see them today.

(e) Effective use of deliverabilities and storage to lessen the gas reserves required for meeting peak deliveries. The above mentioned 1300 MMMCF of gas required are for the sole purpose of meeting daily and seasonal peaks. As time goes on and operations expand and become more efficient, it can be expected that high delivery storage plans will be developed and put into operation that will reduce this residual reserve for deliverability purposes to a minimum. A more likely alternative, however, is that adequate reserves will become available so that maximum efficient use of storage is not imperative.

(f) Relaxation of the 25 per cent legal allowable.





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As the fields become depleted and less economical and profitable to operate, it is to be expected that the 25 per cent open flow legal allowable may be waived, or at least modified, particularly in seasons of great demand for fuel for space heating and domestic purposes.

This, it may be seen that there are a number of factors that are very likely possibilities that can contribute importantly toward providing an ample quantity of gas reserves and sufficient delivery capacities to fulfill the requirements of Canadian Western and Western Pipe Lines. Details will be given later, but for the moment, this analysis, made on a broad plane without the confusion and misunderstanding that frequently accompany detailed analysis, indicates a close balance between reserves, deliverabilities and requirements.

#### New Reserves.

Many Island Lake Area - - As  
it stands today, the largest single contribution to gas reserves which has occurred during the past year in southern Alberta is Britalta Petroleum's development of the Many Island Lake area. At the present time, this appears to represent a marketable reserve of at least 400 MMMCF. The commercially productive area appears to be larger, if anything, than the Medicine Hat area which has already produced 175 MMMCF, and is still given a marketable reserve of 320 MMMCF by the Board.

The area has not been delimited





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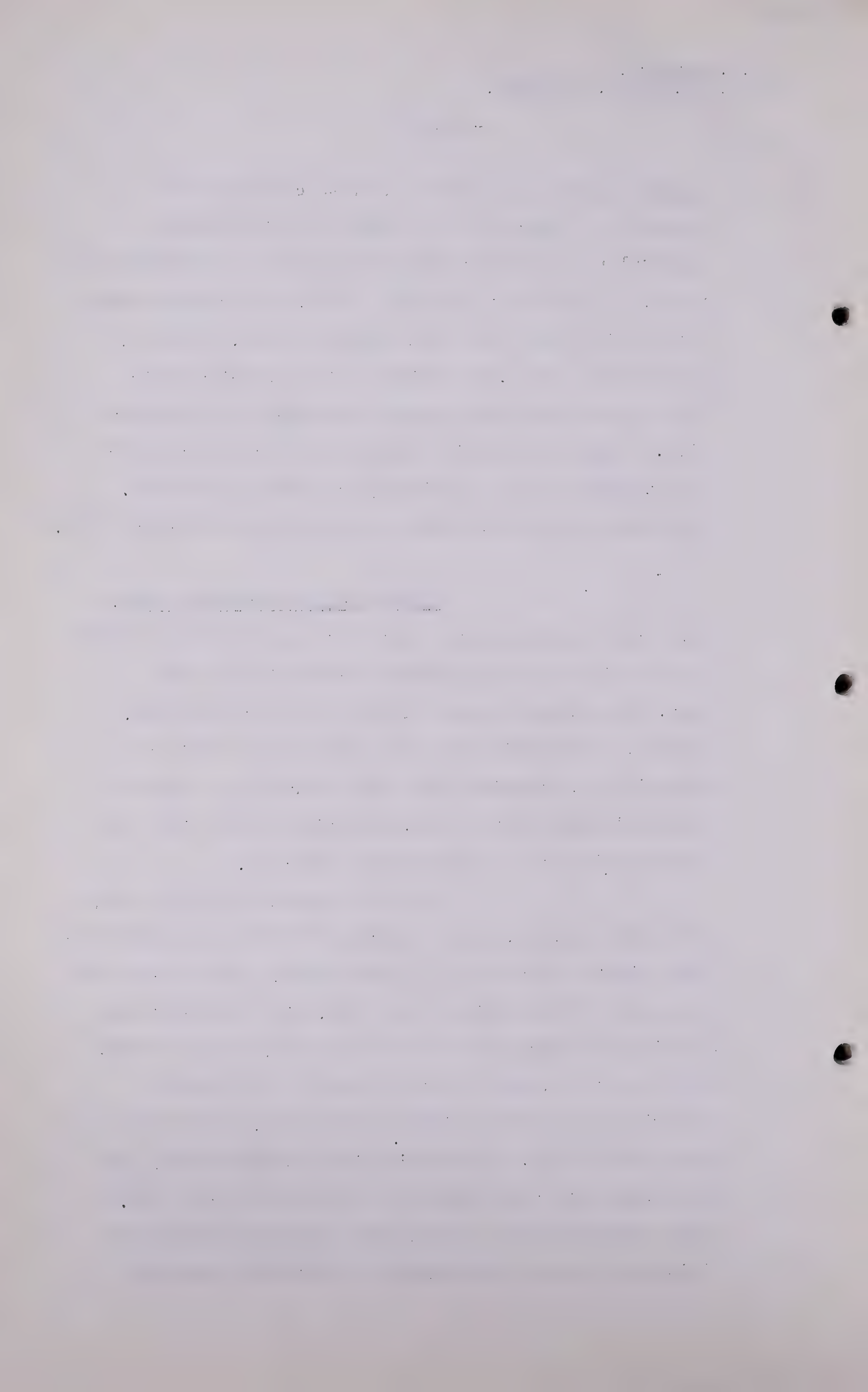
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enough as yet to facilitate a close calculation of reserves and there may be a large outlying area of marginal reserves which will not support the drilling of wells, but which may, over the years, feed certain quantities of gas into the main producing area. At least, for the time being, an estimate of 400 billion cubic feet of marketable gas appears dependable and conservative. Using the Board's figures for discount, a figure of 490 MMMCF for gas originally in place is computed. This has been used in making deliverability determinations.

Cessford-Oyen-Youngstown Area. -

This area is probably the next most important area which has come into play in southern Alberta in the past year. Several wells were drilled in the area in 1949, but it was not until the past year that the activity of Hudson's Bay, Canadian Delhi and others gave impetus to the development of the area, resulting in the discovery and establishment of considerable reserves.

The area contains gas in several different horizons, and Dougherty of DeGolyer & MacNaughton has estimated in behalf of Trans-Canada, a proved reserve in excess of 300 billion cubic feet, with an additional 200 billion cubic feet of probable reserve and a marketable reserve of, and I want to change that figure appearing there of 475 billion cubic feet, because it was altered in Mr. Dougherty's final supplementary, and that figure of 475 changes to 502 billion cubic feet. The area referred to contains the following designated fields and in the neighbourhood of fifteen completed



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gas wells:

Cessford	Sibbald
Oyen	Chinook
Youngstown	Sunnynook

The wells which have been drilled in the area are widely separated and none of the fields have been closely defined to the point where reliable estimates of reserves can be made. However, from the number of wells in the area and the several producing horizons, it is certain that an appreciable reserve exists. From the thickness and multiplicity of the sands, it seems reasonable to expect that an average of 5 billion cubic feet of marketable gas is contained per section of land. If an area of four producing sections is allocated to each of fifteen wells, this would represent a marketable reserve of 300 billion cubic feet. In a broad way, this supports Dougherty's detailed analysis of the area, and it is believed safe to consider this figure as a conservative one. Certainly many more outpost wells will find gas in the area and much more gas than the 300 billion cubic feet will ultimately be proved to exist.

Other Areas. - During the past year a number of other areas became important to the point of clearly indicating the trend toward a larger and larger proved gas reserve for southern Alberta. These can be listed as follows:-





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Hanna	Shell-MacKidd
Craigmyle	Superior-Robertson
Bashaw	Countess
Bailey-Olds	Turin

A number of these are, at the present time, one or two well discoveries and as a whole the reserves that may exist in the group are not as tangible as those in the Many Island Lake or Cessford areas. It would be difficult, if not impossible, to say, at this time, how much gas this group of fields will ultimately represent, but there is no doubt that it will prove to be appreciable and many times more than any figure that can be reliably used today. In order to have something, however, to work with in shaping up a comparison of reserves to requirements, an arbitrary assignment of 100 billion cubic feet of marketable gas is made. Even though it may be impossible to demonstrate this figure from factual data, it nevertheless cannot help but be extremely conservative.

Summary - This makes a new reserve of 800 billion cubic feet of marketable gas in southern Alberta. One-half of this amount, or 400 billion cubic feet of marketable gas, exists in the Many Island Lake area and can be considered as a firm minimum reserve, even though the area is large and the test wells few. The other 400 billion cubic feet are half proved and half probable, but the reserves exist in a number of areas and are so well supported by wells, which





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at least indicate the areal extent of the discoveries,  
that it would seem unreasonable to assign less reserves  
to the group even though they cannot be clearly detailed  
or defined or wholly classed as proved.

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Requirements and Deliverability.

The requirements for the C.W.N.G. System, over and above that which can be supplied from the present connections, have been taken to be the "Deficiencies" column shown in Table 5 of the Board's report.

Column III of the accompanying tabulation of requirements is the same as this "Deficiencies" column.

Column IV is the same as Table I in Western Pipe Lines previous Exhibit Number J-23.

Column V of the accompanying tabulation is the sum of the two previously mentioned columns, III and IV, and is the additional requirements needed for Canadian Western for a full thirty years requirements and the complete twenty years' requirements for Western Pipe Lines. A graph of these requirements accompanies the tabulation and shows the individual, as well as the combined, requirements of the two systems.

Deliverability analyses have been made of the gas supplies in the southern part of the Province, which presumably could be used to support these requirements. Analyses have been made for the following fields and areas:

Pincher Creek  
Pendant d'Oreille (Less M.P. & P. Contract)  
Other established reserves as listed by  
the Board.  
The new Many Island Lake reserve.  
Other new reserves.

A tabulation of gas supplies and deliverability along with a graph titled, "Gas Requirements versus Supplies", is included herewith. With reference to the



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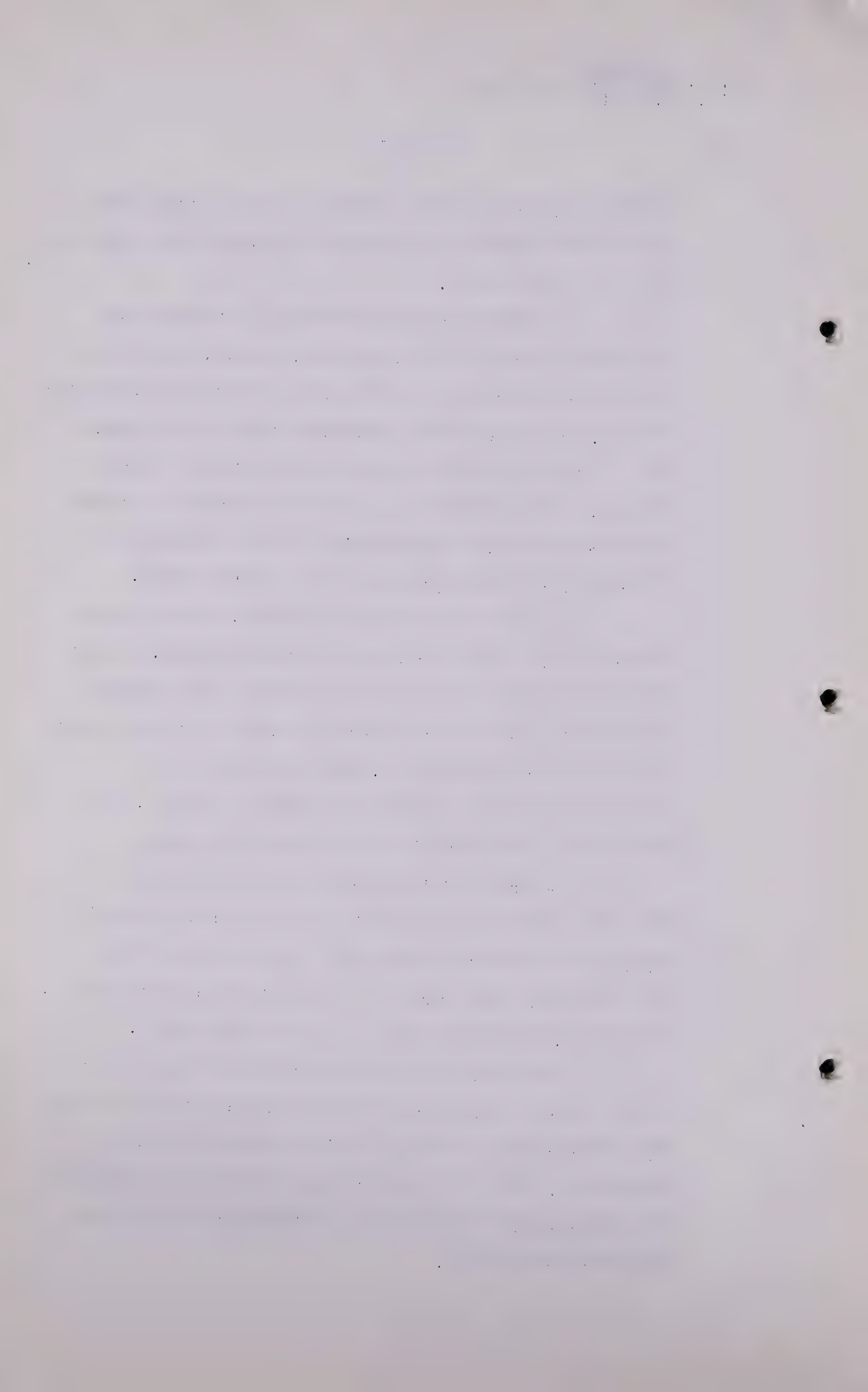
columns on Pincher Creek, Pendant d'Oreille and other established reserves, the Board's findings have been used as a basis throughout.

In making the deliverability estimates one important assumption has been made, namely, that as the fields become depleted and the wells and field capacities decline, the regulations concerning the allowed daily rate of flow in terms of open-flow potentials will be relaxed. This assumption is in the direction of common sense economics and conservation and is believed to be in accordance with expressions made by the Board.

By the use of this assumption, which is considered to be a practical one in every respect, it has been possible to show that the reserves being analysed are able to meet all requirements except for a few years of peak day deliverability, using in each case a realistic if not a conservative number of wells, and without the consideration of storage facilities.

A graph of "Peak Day Requirements versus Available Delivery Capacity" is also included herewith showing the manner in which the reserves are able to meet peak day requirements. The deficiencies shown are, of course, negligible and of little consequence.

The Board has made expressions with respect to the lack of evidence presented on gas storage projects and concern over how such facilities may be used to advantage. This is an operational problem and difficult and speculative to attempt to outline and detail ahead of known conditions.





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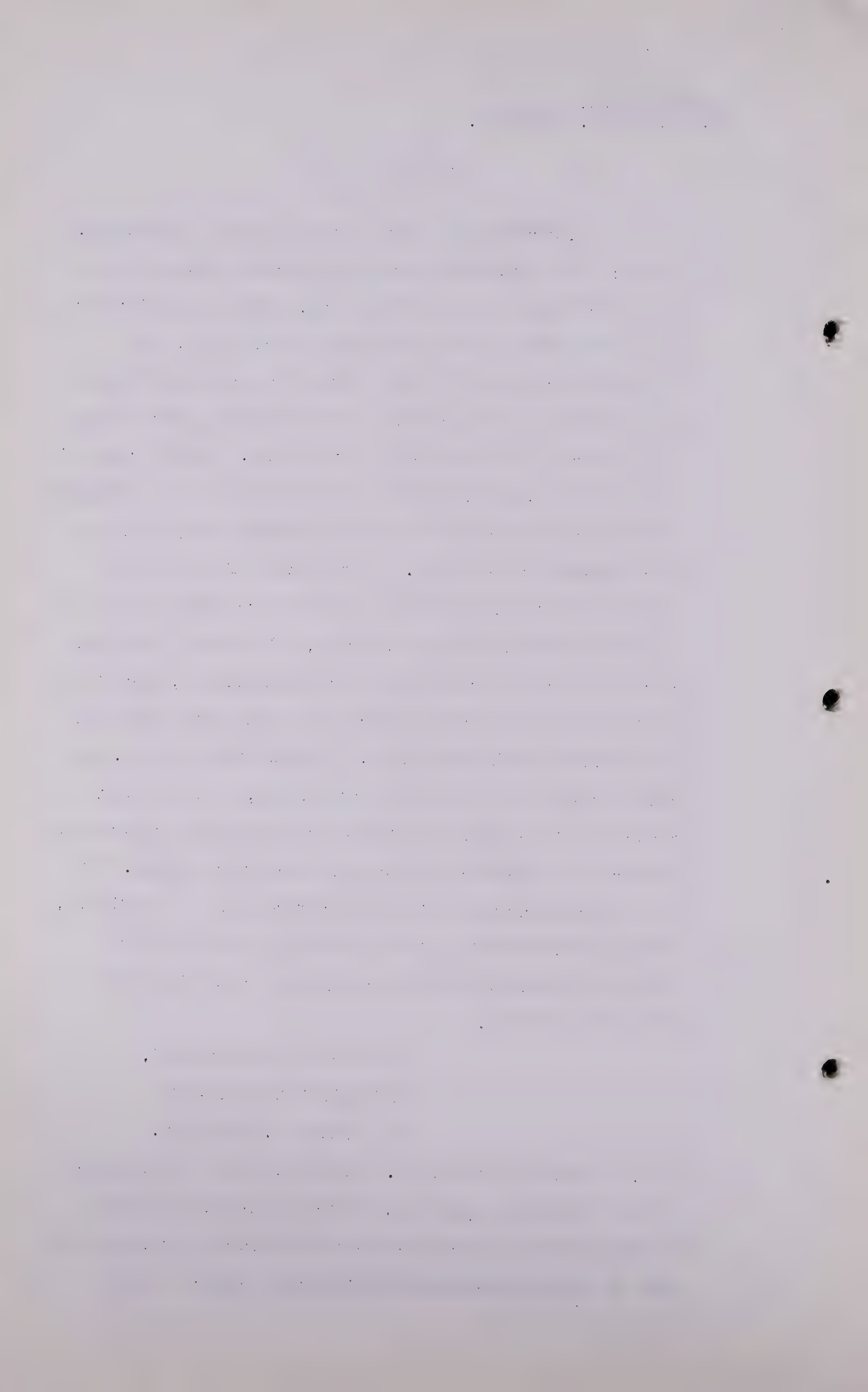
Fundamentally gas storage has two objectives, namely: (1) obtaining greater producing capacity, and (2) increasing the load factor and, thus, the efficiency of utilization of gas transmission facilities. To accomplish the latter in the case of a transcontinental gas pipeline it is necessary for the storage facilities to be near the delivery end of the line. In the case of the C.W.N.G. System, storage facilities have accomplished the principal purpose of greater producing capacity to meet seasonal peak loads. In the case of the present analysis or for Western Pipe Lines there would seem to be no great advantage in gas storage, if adequate delivery capacity were otherwise available when needed, except in so far as it might be beneficial in some minor capacity for serving local conditions. If new flush fields, plus depleted gas fields are both available, then delivery capacity of the depleted field can be wholly or partially restored in off-peak periods and used when needed. It is not the mechanics of the procedure that is difficult, but the availability of the two types of reservoirs properly situated geographically that constitutes the principal problem.

Respectfully submitted,

PETROLEUM CONSULTANTS

by David G. Hawthorn.

Q Now, if you will turn, Mr. Hawthorn, to the table immediately following page 11. You have already outlined in the course of your text how those various columns are made up and the headings sufficiently indicate their



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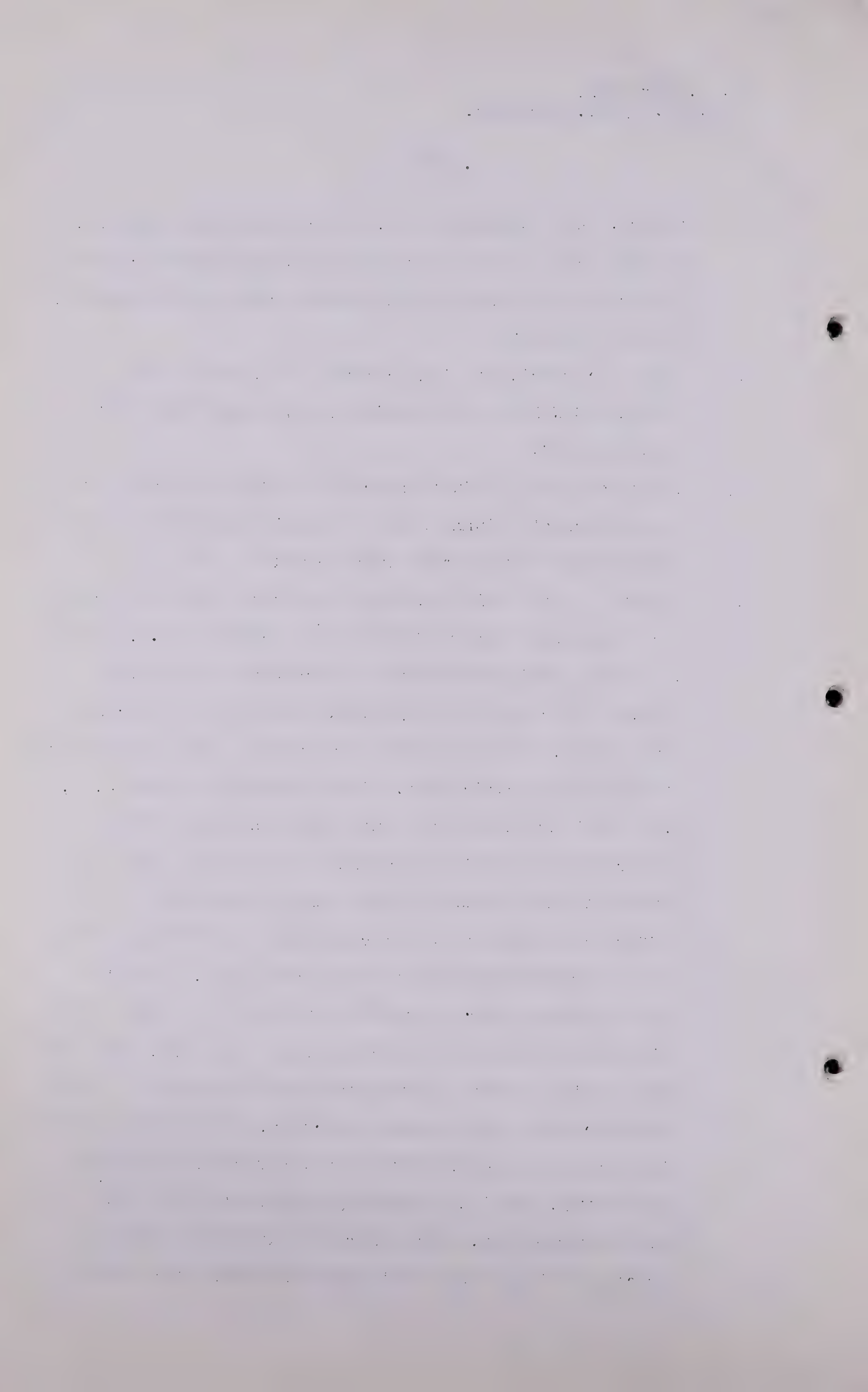
nature. As I understand it, the column Roman numeral V on that page is then carried forward and becomes column 1 on the extended sheet which appears later in the exhibit, is that correct?

A That is correct, and that column 1 is labelled "The Combined C.W.N.G. deficiencies and Western Pipe Line's requirements".

Q And then would you just indicate briefly the nature of the subsequent columns 2 to 8 inclusive and give us any comments you have to make with regard to them?

A Column 2 is the deliverability analysis of Fincher Creek increasing the number of wells to a maximum of 25, using an average daily withdrawal of marketable gas of 100 million cubic feet per day and assuming an 80 per cent load factor, which will make available a peak day delivery of 125 million cubic feet. The subsequent columns 3, 4, 5, 6 and 7 are all of the same type. A daily average withdrawal of marketable gas has been assumed that the number of wells shown and the peak day delivery is the difference between a 25 per cent legal allowable and the daily average withdrawal that has been used. When the daily average figure reaches the 25 per cent legal allowable then we have a load factor of 100 per cent, and from that point on start allowing the legal allowable to take its own course in an upward direction. This is the first time that I have ever worked out deliverability tables in this way, and I am agreeably surprised to see how well it worked out. Heretofore we have always stayed strictly to the 25 per cent legal allowable for reasons





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which present themselves in making our presentations to the Federal Power Commission, but with the expressions that the Board has made it has occurred to me that we could relax in this regard to an extent and deviate from that 25 per cent allowable. Actually, what happens is that the per cent of potential gradually increases from the 25 per cent allowable very slowly for the first few years after it is exceeded and then increasing quite rapidly towards the end of the period. Toward the end of the period the wells are practically, the last year or two, wide open. The last or column VII is a summary of the preceding five columns and shows how the deliverability analysis indicates a balance with the requirements.

Q Have you any comment to make in regard to column VIII in this, Mr. Hawthorn, as to whether it is of material significance?

A The material significance of the deficiencies column has already been covered in the text. Certainly meeting annual volumes throughout the entire period, the deficiencies in meeting the peak day requirements, as shown in the tabulation, are of little consequence and have little significance.

Q Do you care to outline the graphs which appear, Mr. Hawthorn?

A I think I should like to explain the requirements graph, which is the first one. The C.W.N.G. annual requirements shown by the solid line is the figure taken from the Board's report in Table V. The dotted line running down





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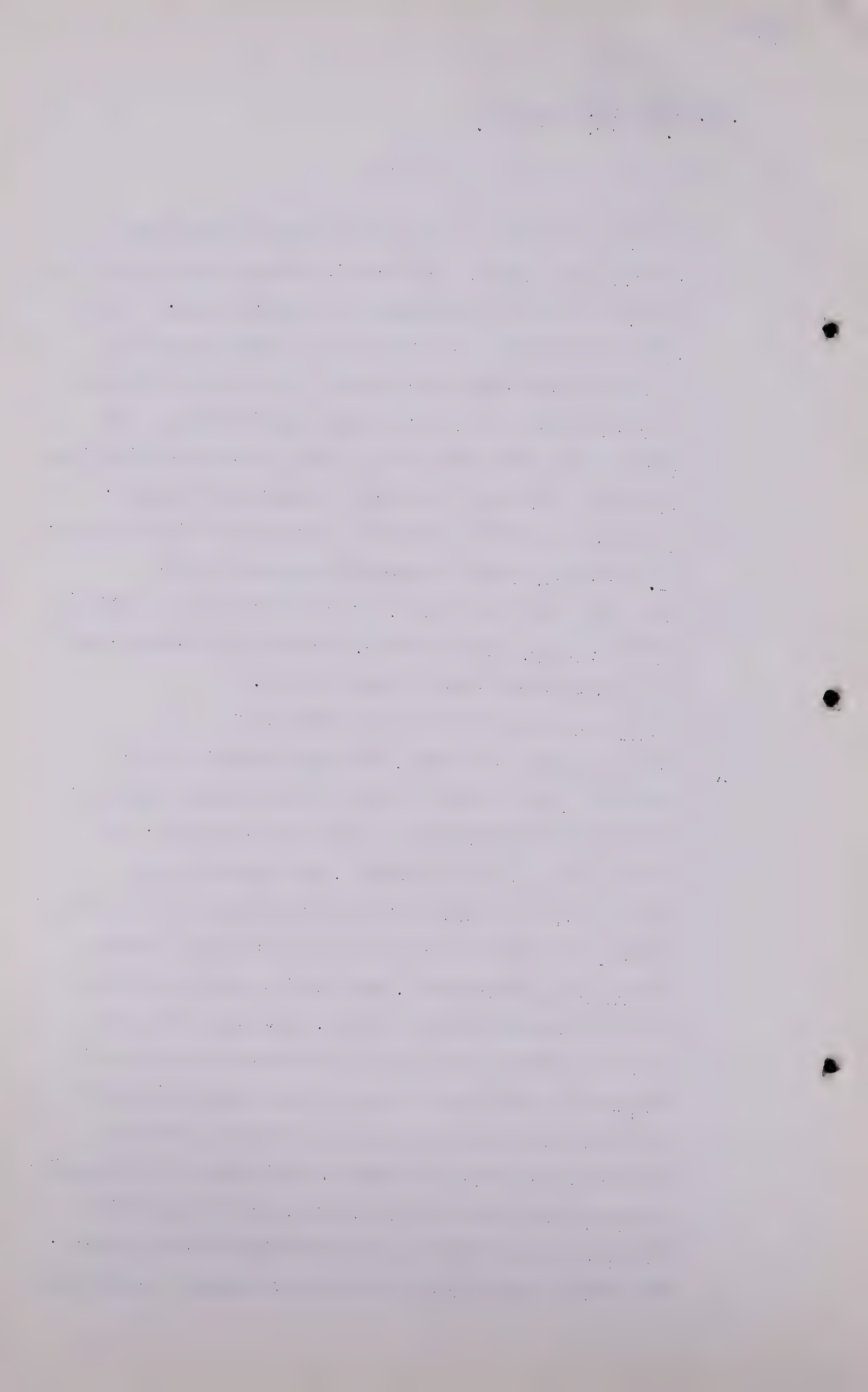
and away from that is what the present connections to C.W.N.G. can supply. The area in between the dotted line and the solid line represents the deficiencies. In all cases these graphs are time versus volume graphs and therefore area represents volume. The other solid line is for Western Pipe Line's annual requirements. The dashed line above that line is the C.W.N.G. deficiencies added on to Western Pipe Line's annual requirements.

Q And when you refer to supplies from present fields there, Mr. Hawthorn, would you explain present fields?

A Those are shown in table V of the Board's Report covering Turner Valley, Jumping Pound, Foremost, Bow Island, and the Foremost California Standard area.

Q Would you proceed to the next graph now?

A The next graph is titled, "Gas Requirements versus Supplies", and the solid line is the combined C.W.N.G. requirements and Western's annual requirements. To explain that a little further, that should be the deficiencies of C.W.N.G.'s system plus Western's requirements. The dashed lines are the graph of the material shown in the tabulation. And again, I mention that area of the graph represents volume. The large area underneath the lowest dotted line is for Pincher Creek and represents a delivery of little over 1 trillion feet to meet the requirements and so on up the graph for the remaining four areas as shown. This shows that the area underneath the solid line is fully covered with some addition in the remaining years between 1972 and 1980. This can be seen from a tabulation in column V where this



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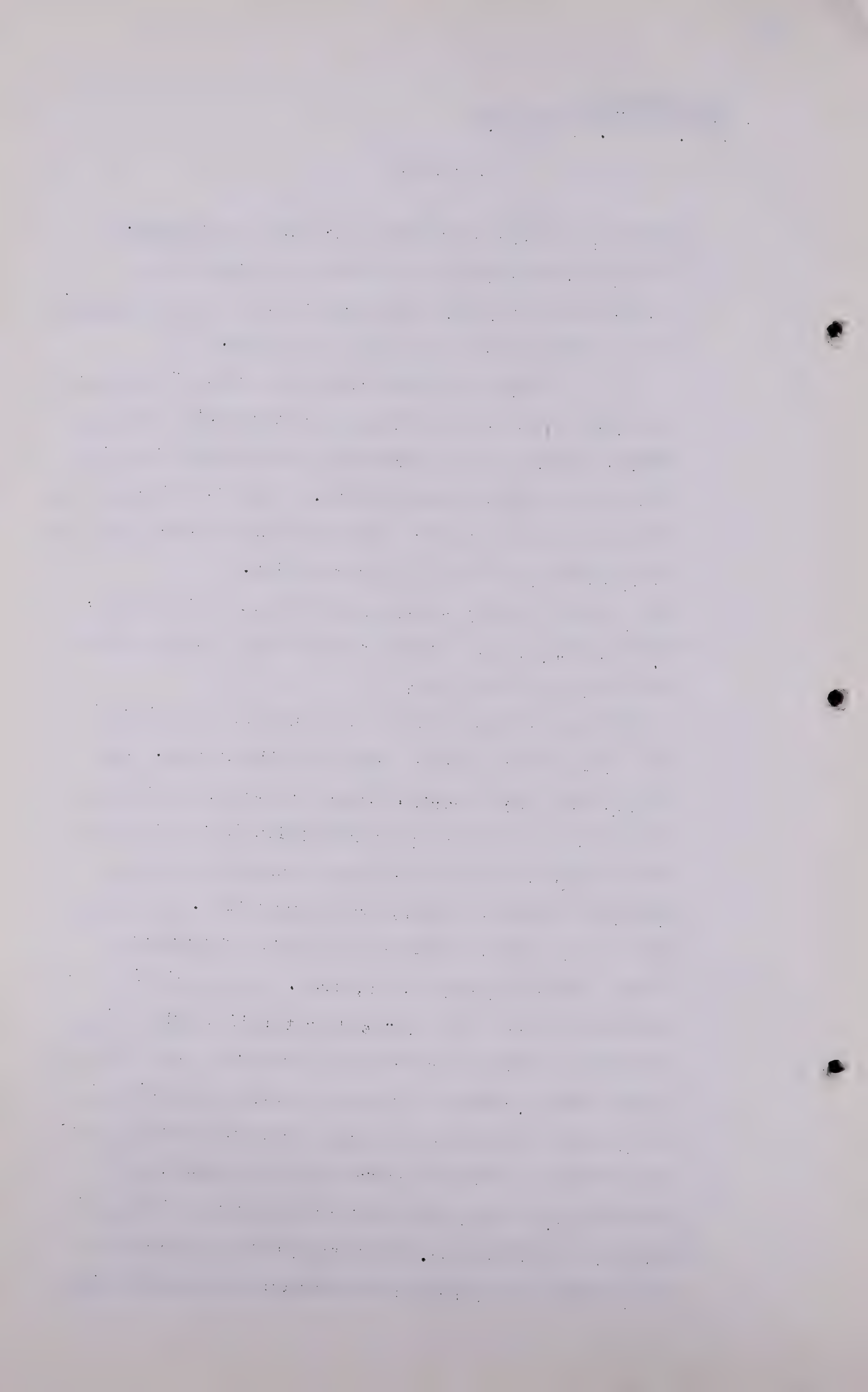
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analysis delivers more than the actual requirements. The actual requirements are shown in column I as 1 trillion 700 billion, and in column VII the gas delivered is a little over 1 trillion 800 billion.

The next and last graph is a graph of the peak day requirements, the average day requirements and the manner in which it is estimated the peak deliveries can fulfill the peak day requirements. Where the dashed line crosses the solid line it represents those small peak day deficiencies as shown in the tabulation.

- Q Have you any general conclusions to give to the Board, Mr. Hawthorn, in the light of this study and the earlier ones which you have made?
- A I would like to sum up these findings in a short statement that I would like to read into the record. Last year at the Joint Hearing before the Board I read into the record a statement prepared by Mr. Lewis and myself which related to our conclusions concerning the gas reserves situation in Alberta at that time. This statement may be found on pages 623 to 625 of transcript volume 7 dated November 7th, 1950. Our conclusion No. 1 was to the effect that, "We do not believe there is an exportable surplus of proved gas reserves in the Province at this time." Events of the past 10½ months with respect to the discovery of new gas reserves and developments makes it necessary for us now to modify this statement, at least in so far as the area of Southern Alberta is concerned. From the present submission it appears that the proved and probable reserves which now





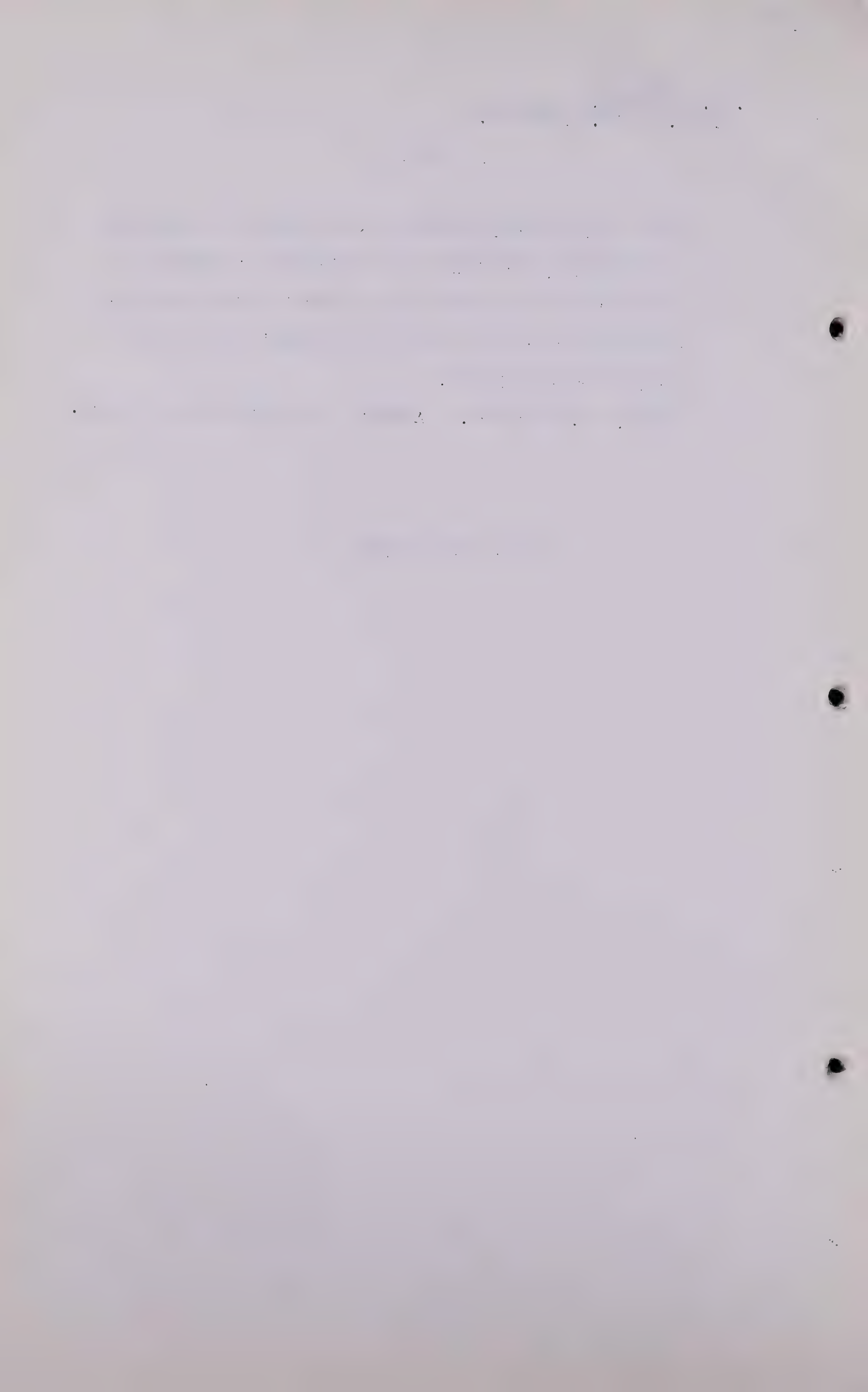
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exist in Southern Alberta and are wholly or partially established by drilling are sufficient or nearly so adequately to meet the full 30-years' requirements of Canadian Western and the full 20-years' requirements for Western Pipe Lines.

Q Thanks, Mr. Hawthorn. Answer the questions put to you.

(Go to page 1136)





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THE CHAIRMAN: Anybody wish to question Mr.  
Hawthorn?

MR. D. P. McDONALD: There is some information, Mr.  
Chairman, I would like to have.

.....

CROSS-EXAMINATION BY MR. McDONALD:

Q Now, taking the item "Gas Supplies and Deliverability  
to Meet the Requirements of the C.W.N.G. System, and  
Western Pipe Lines", on the first page, you have 4  
columns, 1, 2, 3 and 4?

A Yes.

Q "Other Established Reserves" on the heading of Column 4?

A Yes, sir.

Q Could you name the reserves that are included in that  
column?

MR. C. E. SMITH: What is the reference, Mr.  
McDonald?

MR. McDONALD: It is the second tabulation in  
the back of the exhibit. The first page of the second  
tabulation.

A Mr. MdDonald, that refers to the, and is the same group  
of established, reserves as shown in the Board's  
Interim Report at page 45, which is for the fields of  
Black Butte, Manyberries, Princess-Patricia and Smith  
Coulee, with Pendant d'Oreille and Pincher Creek being  
handled by themselves.

Q I was wondering about Jumping Pound? Is that included  
in "Other Established Reserves"?

A Jumping Pound is already in the percentage connected  
group to C.W.N.G. system.



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Q Oh, yes?

A Remembering that the consideration here is only the deficiencies of the C.W.N.G. system.

Q Yes? And then turning the page to Column 6, "Other New Reserves", that refers to the group of reserves which you set up, and what are the fields you had in mind in these "Other New Reserves"?

A That is the new reserves less the Many Island Lake area.

Q Which is referred to on page 7 of your report?

A Yes, that discussion, and you will see at the bottom of that Column 6, 400 billion, and that was referred to in the discussion.

Q Then there was just a matter of explanation too, Mr. Hawthorn. Referring to the second tabulation on the first page, take the year 1978, and in the first column you have your daily average, and this is the combined deficiencies of the Canadian Western system and Western Pipe Lines' requirements, and you have your daily average of 20 billion, I am sorry, 120 billion, as I take it, and that is in the year 1978?

A That is correct.

Q And then you have your daily average from Pincher Creek of 100 billion, Many Island Lake 33.3, and going on with the daily average - yes, that is the total, 133.3.

MR. MARTLAND: That would be millions?

MR. McDONALD: 133.3 billion?

MR. MARTLAND: Million.

Q MR. McDONALD: Yes, 133.3 million cubic feet per day. What were you going to do with the excess gas? That was to go into the continued operation of the pipe





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Line?

A It could be, Mr. McDonald.

Q Yes?

A As I think I explained previously, I have not tried to make a precise balance in these things, but just to make them come out within certain limits.

Q Well, now, just to complete the record, with regard to Pincher Creek, Mr. Hawthorn, is this deliverability schedule used here based on the submission you made in Exhibit 6 of the original Western Pipe Lines hearing?

A No, sir.

Q You have revised it?

A I have revised it in accordance with the Board's decision to place the marketable reserves from Pincher Creek at 1 trillion, 170 billion, as shown at the bottom of the tabulation.

Q Now, in working out your deliverability, could you just give us the factors that you used in comparing them with the other calculation? For instance, your "n" slope?

A That was all used identically to what we did before.

Q That was .85?

A Yes. The average open flow on those two or three wells, which were available to us then, and the same slope.

Q As I recollect, it was .85?

A That is right.

Q To get the details we can go back to the other exhibit?

A That is right.

Q Except that you have. . .

A Except insofar as in this case we have deviated from the. . .





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Q 25%.

A From the 25% open flow allowable, and in this case from, reading from 1966 on, it is 25.4, 25.1, 25.1, 27.5, 30.4, 33.6, 37.3, 42%, 48%, 55%, 64.2%, 75.3%, 89.4%, and the last three years wide open at 100%.

Q Mr. Hawthorn, did you use a shrinkage factor of 25%, or 30%, do you recall, in regard to Pincher Creek?

A We used the Board's figures.

Q Well, that was 30%?

A Yes, sir.

Q And I understand, too, that you adopted the Board's figures with regard to Jumping Pound?

A The Jumping Pound figures did not enter into our calculations.

Q Yes?

A Because they are already in, remembering again that we are only considering the deficiencies.

Q Yes.

.....

CROSS-EXAMINATION BY MR. PORTER:

Q Mr. Hawthorn, I observe that you say there is, in your opinion now, a sufficient supply for the Canadian Western System and enough of a surplus to supply your export demand for Western? I think the words you used were that "the reserves are now great enough" or "nearly great enough" to meet "those two loads."?

A I think those were my words.

Q What do you mean by "nearly"? Would you take a permit if it were granted to you tomorrow. Do you think it



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would be safe?

A Yes, sir.

Q Now?

A What do you mean? May I ask you the question, What do you mean would it be safe to take a permit?

Q Well, you say "nearly enough". You say the reserves are large enough or nearly large enough to supply the two loads, and I wondered what you meant by "nearly"?

A Well, in my submission I used the words approaching, if not equal to . . .

Q Well, I was just trying to narrow it down. Do you think if you were offered a permit tomorrow for your company, would you, having regard to your knowledge of the reserves, say that for practical purposes there is enough and you would write your people to take it?

A To accept the permit?

Q Yes?

A Yes, sir.

Q You would?

A Yes, sir.

Q Now, are the people who own your company aware that you have presented this brief?

A The company that I represent?

Q No, the people that own your company, are they aware that you have presented this brief?

MR.MARTLAND: Mr. Chairman, he is referring to "your company". Mr. Hawthorn is here as an expert witness called to give evidence as to reserves. Mr. Hawthorn has not got a company. I do not see what relevance it has.

MR.PORTER: All right, we will change that.





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Q Mr. Hawthorn, are the owners of the Western Pipe Line Company aware, so far as you know, that you have come here and filed this brief and made these statements?

A I think so.

Q That is fine. That is all, sir, thank you.

.....

CROSS-EXAMINATION BY MR. MACLEOD:

Mr. Chairman, I would like to have a little clarification of the statement on page 10 by Mr. Hawthorn. The statement reads,-

"Analyses have been made for the following fields and areas: Pincher Creek, Pendant d'Oreille (Less M. L. & P. Contract)"

that is the second last line?

A Yes.

Q When you refer to Pendant d'Oreille here and throughout the various graphs and tables, are you confining that to what has been designated the Pendant d'Oreille field, or the Pakowki Lake area?

A The Pendant d'Oreille field.

Q Just the Pendant d'Oreille field?

A That is correct.

Q And less M.L. & P. that is the Montana Power, I presume?

A That is correct.

Q With no "L"?

A With no "L"? That stands to be corrected then, if the official name is Montana Power Company, is it?

Q Montana Power Company?

A Yes.





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Q And then the word "contract". Now, I gather that you are referring to, not a contract which is in evidence by which Montana Power purchases all the gas in the Pakowki Lake area, which I think. . .

A Maybe I should change that to "certificate".

Q Present permit?

A Present permit. Would that be more suitable?

Q Yes?

A That is right, present permit.

Q Are you aware that that permit deals with other fields than Pendant d'Oreille?

A Yes, sir, I think it does.

Q So that this Pendant d'Oreille in this case includes more fields than the specific Pendant d'Oreille field?

A No, sir. I applied it only to the Pendant d'Oreille field and have taken all of the Montana Power permit out of that one field.

Q Very good.

THE CHAIRMAN: Mr. Nolan, do you wish to ask any questions?

MR. NOLAN: Thank you, sir. none.

THE CHAIRMAN: Mr. Smith?

MR. S. B. SMITH: I have no questions, sir.

.....

EXAMINATION BY MR. C. E. SMITH:

Q Mr. Hawthorn, just in furtherance of what Mr. Porter was asking you, not about whether or not somebody knows that you are here or anything like that, but having regard to his questions of whether or not the company that you are presently here as a witness for would accept a permit as



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of today, and I think your answer was "Yes"?

A Yes.

Q I take it you mean that you would advise them to do that, is that correct?

A I think that is right, yes. I certainly did not mean to speak in any official capacity for the company.

Q What I have in mind is this, if a permit were offered today to this company, Western, and you having to advise the financial banking house that would finance it, would you tell them to go ahead and spend the money as of today without further drilling or further development or anything of that kind?

A I question very much whether I would give . . .

Q I do not want to be unfair. If it is unfair, let me know, but that may assist the Board, having your opinion at the present time?

A I question whether it could be financed totally as things stand today, but I think the trend of events is such that it would be given serious consideration, and the money would very likely be available by the time that the project, the many angles of the project could be completed.

Q What I wanted to know, as of today it is not likely to get the money?

A I think that is a very good statement.

Q Now, just briefly referring to your statement here in Exhibit 34, at page 2, you made the statement at the bottom of the second, of the last paragraph of the page,

"For the time being, at least, this seems to be a practical approach inasmuch as both areas..."





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and we are talking about the southern and northern areas?

A Yes, sir.

Q "....are about on a par with respect to gas reserves and each area is progressing at about the same rate with respect to discoveries and development." Now, you probably were right here and heard some evidence to the effect that the southern part of the Province was going faster? Is there any great concern as to the difference with regard to what they said and what you said?

A That statement was made in a very general way, and just exactly when you look at it, it is when you look at it, whether you look at it at the time before Leduc or afterwards.

Q But I take it there is no great significance to be attached to it insofar as your submission is concerned?

A That is correct. I think it is quite phenomenal to think that two large areas like Calgary and the Edmonton areas can be running absolutely as neck and neck as they are.

Q O.K. Turning to page 4, I just wanted to be certain of one thing near the bottom of the page. The fourth line from the bottom, and you say there, it is the seventh line from the bottom, you refer to this,-

"The Board has also found that an established reserve amounting to 1,589 MMMCF exists in six other fields in southern Alberta."

Would you detail those six other fields, or do you remember them offhand?





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A Those are the ones that I gave just a few minutes ago.

Q To Mr. McDonald?

A To Mr. McDonald, on page 45 of the Board's report.

Q Yes?

A And reading from the Board's report, "Looking to other areas of established reserves in the southern part of the Province, the following suggest themselves:". . .

Q Yes?

A And it gives Black Butte, Manyberries, Princess-Patricia, Pendant d'Oreille, Pincher Creek and Smith Coulee, with a total reserve of 1 trillion, 589 billion cubic feet.

Q And you find that is referred to at page 45?

A That is right.

Q Of the Board's Report?

A That is right.

Q Now, referring to page 5, and taking first sub-paragraph (a), will you tell me, Mr. Hawthorn, when that was written, or as of what time that applied? Was it before these Hearings at all, or during them, or since some submissions have been made?

A I wrote that paragraph in the neighbourhood of two weeks ago, I believe.

Q All I wanted to get at, as of now, is there any amendment which you wish to make to your figure there?

A I do not think so. I have treated the new reserves in southern Alberta in a very general manner. I think probably the Many Island Lake area belonging to Britalta Petroleums and Deep Rock will be a pretty firm reserve of 400 billion. I have transmitted the other fields in a like amount.



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Q TThe reason I ask that is that when you were dealing with the Cessford-Oyen-Youngstown area you made much of the fact that you were now adding or changing the 475 billion cubic feet to 502 billion cubic feet, that was simply because DeGolyer & MacNaughton's estimate had been revised?

A That is correct.

Q That does not change your 800 billion?

A No, sir.

Q Yes?

A I had to change that one figure because I spoke of it specifically.

Q Yes?

A Where I spoke of the other figures in a general manner.

Q As a matter of fact, and I may be probably wrong, but I still have a note here that the DeGolyer & MacNaughton figure was 575, and you have 502. I will take your 502, as you are probably more correct than I am. With regard to (b) you say, this is with regard to Jumping Pound,

"The hope of this has been expressed by the Board.

Also there is the drilling of more wells that will facilitate a speedier and more economic recovery of the gas reserve. It is believed the efficiency of recovery, as shown in the Board's deliverability analysis of Jumping Pound, is low and that more gas needs to be taken out faster to provide a satisfactory operation for the operators."

Can you expand a little bit on that?

A I will be glad to, Mr.Smith. I am referring to Table 5





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of the Board's Report, and in that Table the annual takes have been decreased down to the year 1979-80, to down to 6 billion cubic feet a year, and a total withdrawal in the 30 years of only 59% of the reserves. The Board has indicated an established reserve of 540 billion cubic feet, and in those 30 years have only withdrawn, according to this tabulation, 319 billion, or, as I said, 59%?

A Yes.

Q Now, if that field in the year 1980 is down to only an annual delivery of 6 billion cubic feet, I estimate it will take roughly 60 to 70 years more at that rate to get the remaining 41% out, and I suggest that that is an uneconomical rate of producing the field.

Q You also suggest that Shell would not like that idea?

A Beg pardon?

Q You also suggest that Shell would not like that idea?

A I suggest that, yes.

Q Isn't that what you meant when you talked about "satisfactory operation for the operators"?

A That is correct.

Q Have you discussed that phase of it at all?

A No.

Q You have not?

A No. I just mention it as a general principle, that we can drag the production life of these fields out too long.



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Q In other words, you feel that it should be speeded up?

A That is right. That is my general observation.

Q And turning the page then to page 6 and referring first to paragraph (e) on page 6,

"The effective use of deliverabilities and storage to lessen the gas reserves required for meeting peak deliveries. The above mentioned 1300 MMcf. of gas required for the sole purpose of meeting daily and seasonable peaks. As time goes on and operations expand and become more efficient, it can be expected that high delivery storage plans will be developed and put into operation that will reduce this residual reserve for deliverability purposes to a minimum."

Can you illustrate or expand that a bit, that expectancy you speak of?

A If a trans-continental line should provide storage at the terminus or near the terminus of their line it would allow the pipeline to operate on a high load factor.

Q What I meant by illustrate, have you anything in mind about area?

A Nothing specifically. No, Mr. Smith, I have stated in the last page of this submission that I think to try to detail storage plans too far ahead gets into pretty much the speculative aspect of the thing.

Q You have no area, for instance, in mind?

A No, sir, I do not.

Q People have talked before here about Turner Valley?

A Yes.





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Q Some mentioned Jumping Pound. In view of what you said, that might be quite a long way in the future?

A That is right.

Q You have nothing else?

A No, sir, I have no specific ideas in mind.

Q Coming to an old favourite, your paragraph (f). You just answered to Mr. McDonald a portion of what I had intended asking you, that is, in your evidence when you gave some detail of your percentages between the time you used 25 per cent and the time you come to your 100 per cent open flow?

A Yes, sir.

Q And you started with 25 point something and so on and so forth and I could not keep track of all that. Is there any formula you used to cover those intervening periods? I mean, do you increase so much a year or is it because of the requirements or what?

A No, sir, I think the controlling factor is probably what you assign as the economical number of wells.

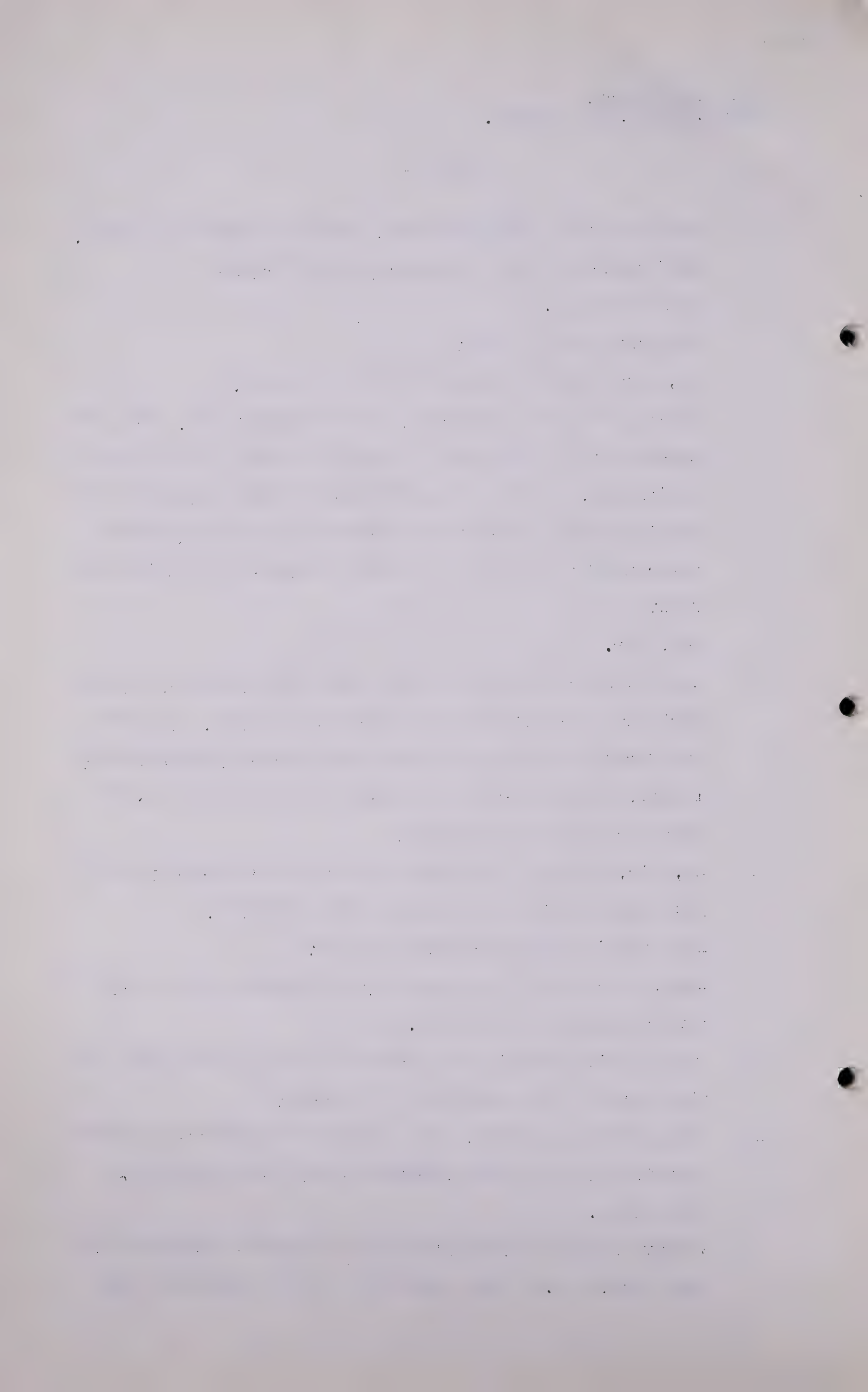
Q And you pin your percentage to that?

A Well, percentage is governed by the number of wells and how the potential declines.

Q Do you still have in mind damage to wells throughout all this period, the possibility of damage?

A The possibility of it, yes. That is an operational problem that I think the operators can be relied upon to look after.

Q We have heard it frequently but it may be a problem for the Board, too. They may have a lot to say about this



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question. I wonder if you can give them any more help?

A I will say that my analysis has a weakness in it in that I stretch it clear to a wide open flow at the last year or so of the period.

Q What about practical operation?

A That is certainly not practical but I say again it is within the limits of the accuracy of these deliverability analyses.

Q I do not know whether I follow you when you say there again it is not practical. Do you mean that it can not be done, to use my language, should not be done?

A I do not think it is practical to rely on this group of fields and wells, all of them running 100 per cent open flow, as is the case in the last few years of my analysis.

Q Probably that is what I have in mind.

A To be more specific, I think probably you could expect that maybe 75 per cent of open flow of all the wells would be about as much as you could expect to operate them at.

Q I think somebody else suggested that here the other day.

A Yes.

Q Now, at the bottom of page 6, speaking of Many Islands Lake area, you use the expression, "at the present time". I take it you mean at the time you prepared this submission, is that correct?

A That is correct.

Q Have you had an opportunity of reading the submission by Mr. Slipper and also to hear him in evidence?

A Yes, sir.





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Q I was wondering if by any chance you did not want to go up a bit after you heard him?

A I do not think so. I think that is a good enough general answer to place on it at this time.

Q I just wanted to make sure you considered him as well as Mr. Dougherty and others.

A Yes, sir.

Q Oh, yes, you say at page 10 -- will you look at that, Mr. Hawthorn, the very last paragraph, "the use of this assumption", and that is what we have been discussing, namely, the relaxing of the 25 per cent, isn't it? Maybe you had better read the paragraph first.

A Do you wish me to read it?

Q Just to yourself.

A Oh, I see.

Q Then you go on to say, -

"By the use of this assumption, which is considered to be a practical one in every respect, it has been possible to show that the reserves being analysed are able to meet all requirements except for a few years of peak day deliverability, using in each case a realistic if not a conservative number of wells, and without the consideration of storage facilities.

A graph of 'Peak Day Requirements versus Available Delivery Capacity' is also included herewith showing the manner in which the reserves are able to meet peak day requirements. The deficiencies shown are, of course, negligible and of little consequence."



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I would like to expand a little further on being negligible and of little consequence. What struck me was, in 40 below zero someday they might be of considerable consequence, that is all, if you could not meet your peak.

A What that was termed to be, a well within the limits of accuracy of any one of these deliverability analyses, and you must remember that there is an almost infinite number of types of analyses we can make using the same basic figures, and that this particular analysis and the figures developed should come out so close in only having a peak day deficiency, I think, in five years.

Q Four, isn't it?

A Well, there is a little in the very last year, too.

Q I beg your pardon, I missed that.

A From the standpoint of the person making the analysis they are of no real consequence.

Q Well, let me put it this way, take your high line, 1972, and you show in column 8 a deficiency of 80 million. What I am wondering about is whether that might not be of some consequence, that is all.

A Well, further than that, Mr. Smith, all of the leniencies expressed as A, B, C, D, E, are applicable to this table. That is, if more gas can be secured out of Jumping Pound it would add to the available reserves that could come in here. Furthermore, you can see from the column 6, "All Other Reserves", that we have only taken out 149 billion out of the available 400 billion, so conceivably you could draw those additional reserves out and make up any deficiencies.





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Exam. by Dr. Govier.

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Q Presumably you do not need this column at all, I suppose, that is right, with regard to peak days?

A Conceivably so. That is just the mathematics of the way the tabulation adds up.

Q But if we have a deficiency of 80 million it is of some considerable consequence?

A That is entirely correct, Mr. Smith. I do not mean to imply that if the deficiency were real that it would be of no consequence.

Q If the deficiency is as shown in your table?

A That is right.

Q MR. MACLEOD: Mr. Hawthorn, there is a typographical error on page 3. Haven't you got to put an "M" in the second line of the last paragraph, the last complete paragraph on page 3? You have dropped an "M"?

A Thank you very much, that is correct, and there is another typographical error.

THE CHAIRMAN: Mr. Bredin?

MR. BREDIN: I have no questions, sir.

EXAMINATION BY DR. GOVIER:

Q Mr. Hawthorn, a few moments ago in answer to Mr. McDonald you quoted some figures relating to the percentage of open flow. Were those figures for Pincher Creek or were they for all of the fields?

A Those figures were for Pincher Creek alone, that is correct.

Q And in column 7 in your last tabulation, it gives the total for all the fields that you are considering, is that right?



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Exam. by Dr. Govier.

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A Yes, sir.

Q That is the composite picture?

A Yes, sir.

Q Did you make any calculations, Mr. Hawthorn, of the sand face pressure, the sand face differential that went along with the program which you have assumed?

A No, sir, I did not.

Q And while you said that in the last two or three years your figures for Pincher Creek may be a little unrealistic, you do not think it affects the over-all plan too much?

A That is right. Dr. Govier, there is the weakness in this analysis that those last few years are unrealistic. I do not think it is realistic to think of running that whole group of fields with all the two or three hundred wells in them wide open.

Q You did not make that assumption, though, did you, because in column 7 you showed a composite picture reaching a maximum of 42 per cent of open flow. That is what I was wondering about because I thought you said all the fields, and yet your report indicates that that applied only to Pincher Creek.

A That is the way the composite turns out. Remember, we still have a lot of wells and a lot of delivery capacity in this column 6 labelled, "Other New Reserves", so that from that standpoint, why these details are misleading. I will try to give you a little more detail on that. In the case of column 4, "Other Established Reserves", the analysis exceeds the 25 per cent allowable in 1974 and runs up to 52.4 per cent in the last year.





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Q 1974, did you say?

A Yes, sir.

Q That is where the load factor is 85.8 per cent, is it?

A That is column 4 where the load factor is 100 per cent.

Q 1976. Is it 1976 or 1974, Mr. Hawthorn? I am a little mixed up here.

A Well, that is correct, it lines across to 1976. My lining up on my work sheet and the tabulation may be a little off. In the case of Pendant d'Oreille we run up to 45.7 per cent of the potential in the last year of take.

Q Now, you would deviate from 25 per cent starting in 1968, I imagine, would you?

A Yes, sir. Other new reserves, the top per cent of potential is 20.5 per cent.

Q How did you get the potential for the other reserves? What did you take as a measure of potential?

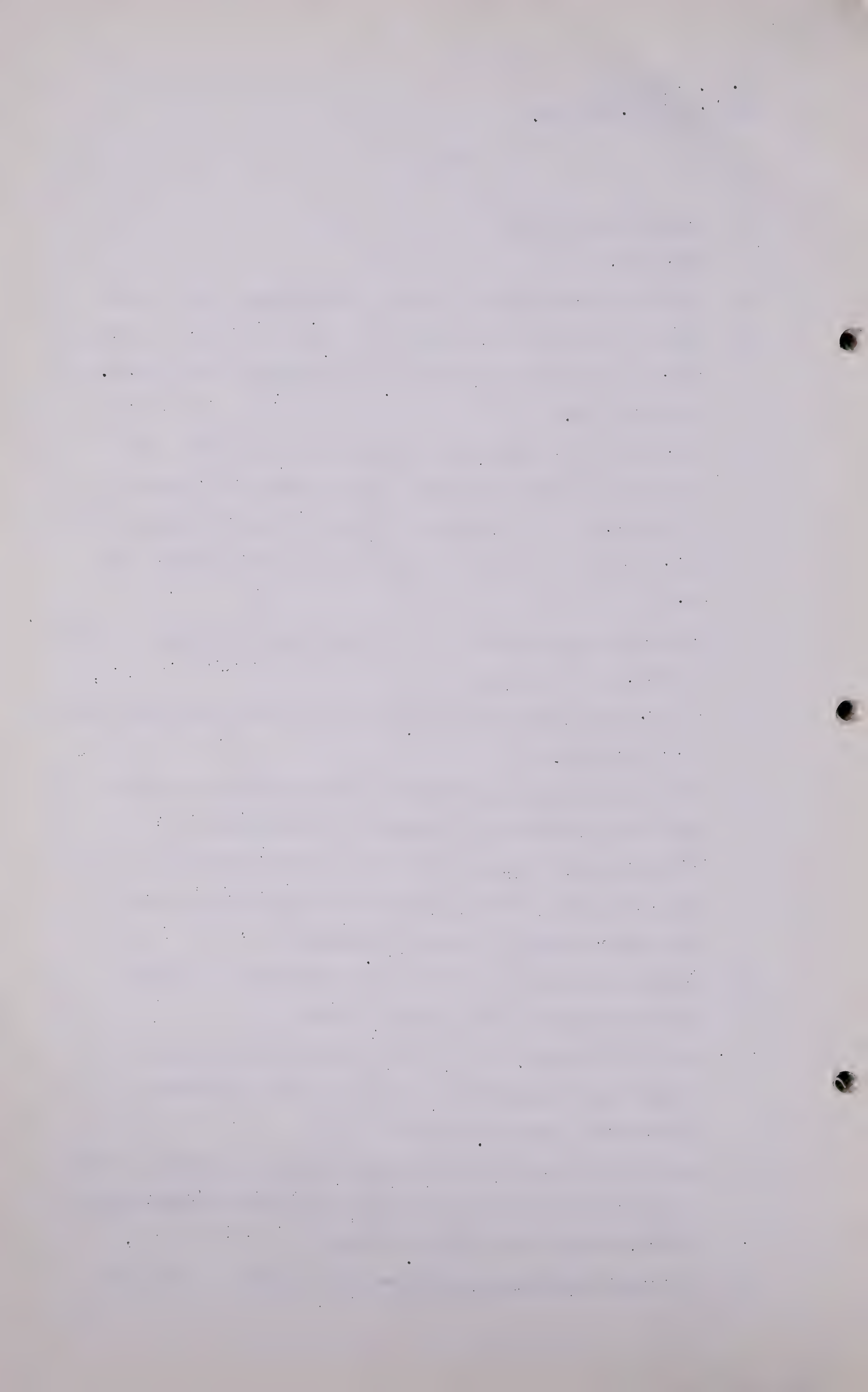
A Average potential starting at 7 million cubic feet per day per well. With a scarcity of information, that is the best determination we can make.

Q Does that represent some sort of average or available test of wells in that general area?

A Yes, as best we could. Many Islands Lake we get up to a per cent of potential of 95.5 in the last year of withdrawal, of production.

Q Do you have the corresponding figures for Pincher Creek? would you just give me the first and the terminal figures, Mr. Hawthorn, that would be fine.

A The well-drilling program we have assumed to keep the



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percent of potential between 23 per cent and 25 per cent down to somewhere around 1966 or 1967 where it begins to exceed the 25 per cent allowable in accordance with the figures that I read a little while ago.

Q Thank you. Mr. Hawthorn, do you have any experience that would indicate that the percentage withdrawal figures which your tabulation reflects are reasonable figures for a 30-year period? I am referring to the 87 per cent from Pincher Creek, the 82 per cent from Many Islands and 97 per cent for other established reserves, etc. Are those reasonable figures?

A Well, I will answer your question, Dr. Govier, in saying this: In reviewing this analysis with a critical eye I see some weaknesses in it but I do not see anything in it that is too badly out of line, a practical standpoint. As far as furnishing you with some concrete examples, I am afraid I am unable to do so.

Q Well, understanding that, that there may be details where this is out, but the over-all picture is in your opinion a fair one, do you think that the percentage withdrawals of say 85 to 90 per cent are reasonable, or is that one of the ways in which this analysis falls down?

A I think those percents of potentials that we have developed here towards the latter life of the fields is a reasonably realistic and practical one, yes.

Q But you are referring to the potential. I was referring to the percentage of total reserves withdrawn, not to the per cent of absolute open flow.

A Oh, I am sorry. I misunderstood your question.





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Q Do you see the figures I mean, Mr. Hawthorn?

A Yes, sir.

Q At the bottom of your column.

A I think I have asked myself that same question and I think if the market is available and the demand for the gas from the field is present I think it is within reason to deplete those areas in the 30-years time.

Q To the extent of 85 to 90 per cent?

A I think so.

Q Do you have any experience on that particular phase of the problem?

A No, I do not think so, and the question may be whether any experience is available to that extent.

Q One of the things that upsets me a little, Mr. Hawthorn, is this, in the early part of your submission you made reference to the fact that approximately two-thirds of the established marketable gas in the ground might be considered the market requirements for a 30-year period, and yet your tabulation reads that you have actually assumed the usage of some 85 per cent. Do you see the inconsistency of it?

A Yes, I do, Dr. Govier. The first part that you refer to is the Board's finding, and if these deliverability analyses had adhered to the 25 per cent allowable I assure you no percentages like that would be extracted from these fields. And that relates back to my previous statement that I was pleased to see what this deviation of the 25 per cent results in. In adhering to the 25 per cent open flow allowable you get a long drawn-out period of the well-known strip stage production, and that can



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result in two things, either a long period of some economical production of the field or premature abandonment of them, and we all know those factors so well, and that is why I was prompted to make the remark that this is the first time that I have ever deviated from this 25 per cent allowable, and I was pleased to see the results that it showed.

Q Well, then, you think that probably the principal reason why these present withdrawals are so much greater than the 66.7 per cent you referred to earlier is the fact that you have deviated from the 25 per cent open flow?

A I think that is the principal factor.

Q And the percentage withdrawals would be realistic, taking into account that the increased percentage of open flow was realistic?

A That is correct.

Q There is one other question, Mr. Hawthorn. I do not recall whether you in your previous reserves submission used the word "probable" or not, did you? Did you refer to probable reserves?

A Yes, sir.

Q Are you using the word now in the same sense that you used it then, in this present submission?

A I have in a general way, yes, sir.

Q And is that in approximately the same sense that Mr. Dougherty uses the word?

A I would rather stay by our original expression of what we meant by probable and not try to determine it in the light of Mr. Dougherty.





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Q Well, talking about your own meaning of the word "probable", Mr. Hawthorn, do you believe that a banking house would wish to discount any gas labelled as "probable gas" by yourself to a certain amount?

A I am sure they would if I had stepped up a certain probable amount and had not discounted it myself. Discounting it yourself, would in substance, the idea is to try to reduce the probable and possible reserves and place those figures in terms of what you think is a safe proved reserve. Isn't that what you attempt to do in discounting reserves?

Q Well, --

A Or pick a probable reserve and say, "This represents the equivalent of so much in proved reserves."

Q I have been trying to find out what various people are doing?

A I know you have.

Q And I have had considerable difficulty. Mr. Dougherty made reference to the fact that his probable gas had already been discounted, and Mr. Dougherty's counsel referred to that again, but in checking Mr. Dougherty's method of calculation I noticed that he calculates in exactly the same way whether he is calculating proven gas or probable gas, and I am unable to say where in his case, at any rate, he has applied a discount. Can you explain to me where you have already applied a discount in your probable gas?

A In this present submission here?

Q Yes, and in general in your way of thinking.



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- A Well, in this present submission I just arbitrarily assumed certain figures that I felt were well on a safe and conservative side.
- Q Well, does that mean this, that your probable gas in this submission is gas that you think is proven but you do not know just where it is? I am not trying to be facetious, Mr. Hawthorn.
- A I know you are not, Dr. Govier. Well, some of it is proven and some of it is probable, you can not separate the two apart. As we have pointed out in our original submission, and I think that you pointed it out, if I remember correctly, in the Interim Report, that it is difficult to draw the line between proved and probable, and we spoke of them in our original report, and we spoke of them here, as a group of proved and probable reserves, and tried to attach a single figure to that group which would seem to be sufficiently conservative and safe enough to represent the equivalent of proved reserves.
- Q Why do you ever use the word "probable" at all, Mr. Hawthorn? I do not understand it. It seems to me by that last answer of yours that you would be better off to take and talk about proven gas.
- A Well, for instance, in the case of Pincher Creek, do we want to class Pincher Creek as a fully proved reserve, or does it still have a certain element of speculation about it that we want, at least, to inject into it, that there is still a certain amount of probability, a certain element of probability in it that we can not firmly pin down.





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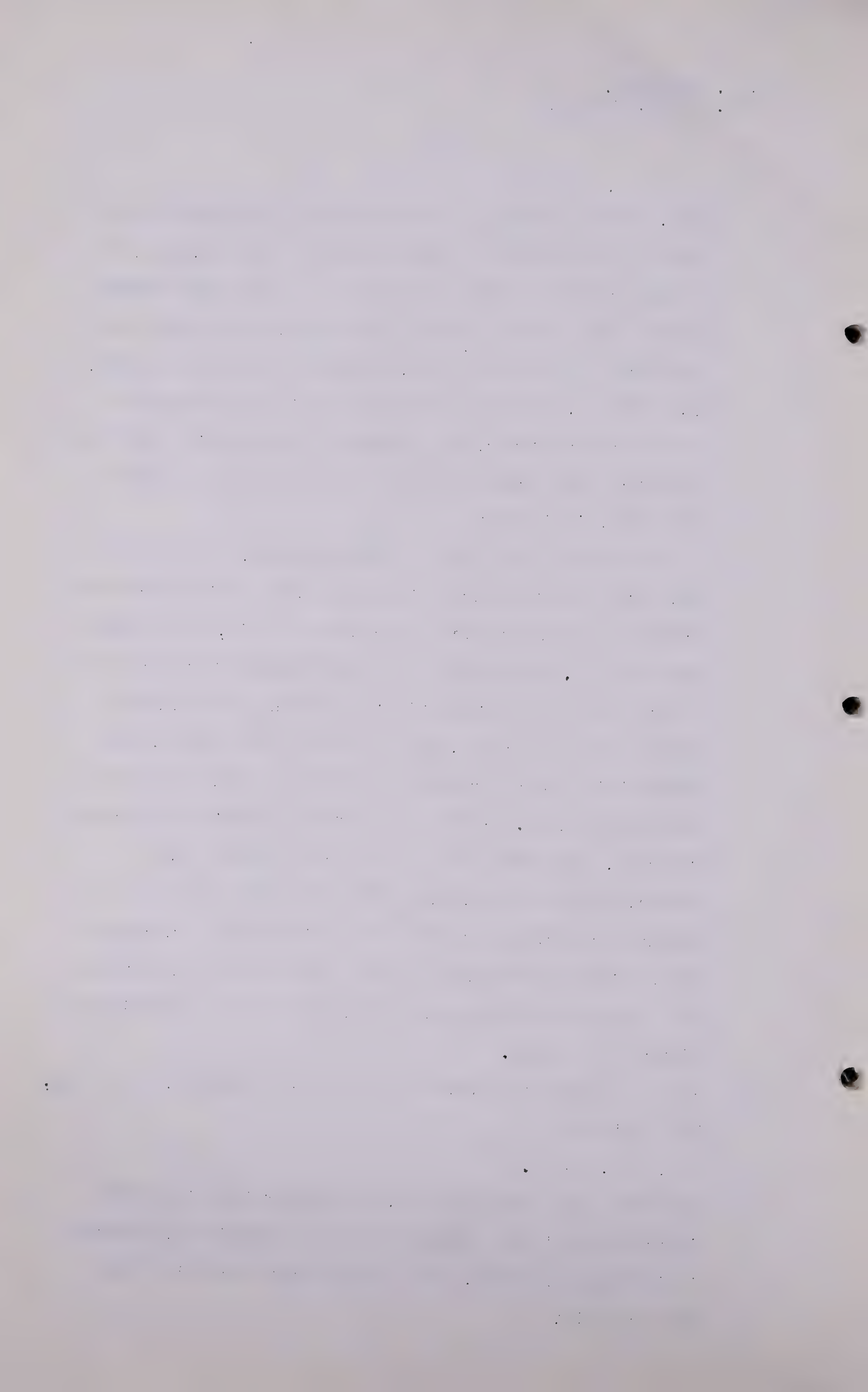
Q Well, if the purpose of using the word "probable" is to inject this element of speculation into the figures, is it proper then to take it and use it in the same sense as you would use the number for proven, that number that represents the probable gas, because if in the long run, Mr. Hawthorn, the number is used in the same sense as is the proven number, the element of speculation has been introduced and argued again by the time that you come to the total, is it not?

A I presume that is a way of expressing it, but I do not know how you can separate the two. It is not a mechanical procedure or mathematical procedure. It is, as we have expressed it, and as the Board has expressed it, there is a large element of judgment and opinion in the matter. In many of these cases, we introduced that opinion and judgment to label a reserve, and we give that reserve a particular label. In the case of the Board's established reserves, does that mean in each case always fully proved, or does that mean that there might be some probable reserves in there too? I think it is a combination of the proved and probable which can be interpreted as a good opinion amounting to a good firm or established figure of so much.

Q It is a judgment combination of the two figures, is it not, Mr. Hawthorn?

A Yes, sir, it is.

Q And what I am asking you is, if you can help the Board in arriving at how judgment should be applied in regard to those two figures, the one for proven and the other for probable?



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A There is no formula for it, Dr. Govier, except to study the particular reserves to the point where your judgment is fully developed.

MR. C.E. SMITH: And until you get to that point you are lost.

A I might read what Mr. Lewis said in our original report, because I was interested in reading it over to myself.

"In the work we have done on gas reserves in Alberta we have been guided by the classification and definition of reserves as follows: As used in this report, the term 'proved' means enough information and data are available to permit making estimates that are subject to only small errors, a minor difference of interpretation or opinion. The term 'probable' means that while there is a substantial amount of information and evidence available, it is, nevertheless, incomplete, and the estimates are, therefore, subject to much larger errors and much wider differences of interpretation and opinion. There can be no precise definition of the term 'proved and probable' in estimating reserves in a strict sense. The only thing proved about a reserve is that which can be obtained from wells drilled into the formation or reserve. The evidence may be logs, formation samples, pressures and production records. Everything else must be surmised. However, engineers and geologists may from experience have developed judgment in classifying reserves, depending on





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"how reliable the basic data and estimates might be. Since matters of experience and judgment are involved, two estimators giving the same evidence may at times differ widely, particularly with respect to probable reserves."

Q We have observed that. Mr. Hawthorn, would it be fair for me to ask you my question another way. If you pick for yourself, as an example, one of the fields which you have studied in some detail, and for which you have reported a certain amount of proven reserves, and a certain amount of probable reserves, could you, in the case of that field, taken as an example, give the Board the benefit of your judgment in combining those two figures to get a figure that would represent the amount of gas that you think we could reasonably count upon? You say there is no formula, that it is a matter of judgment and of detailed judgment of an individual field. I certainly appreciate that. Can you show us how that would work out in an example?

A I am sorry, Dr. Govier, it is one of those questions that, again, I can only answer by saying that there is no rule by which you proceed, you merely study the reserves by the evidence to the point where you come up with your own answer, and your own thinking and your own opinion of it, and, again, the other person might come up and he has just as much right to come up with a different answer as you have to come up with the one you have come up with, and then, with all due respect to fellow consultants and fellow appraisers, one wants



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to be pretty careful before he starts to criticize or pass judgment or discount any estimator's answer, unless he is equally well informed or has done enough work to have developed a sense of judgment which in his own opinion permits him to place discount factors on it, or, as the case may be, increases the reserves.

Q Well, I am not asking you to pass judgment on someone else, Mr. Hawthorn; I was asking you to take a look at some of your own figures and see if you could apply your judgment to them and come up with an answer and say, "That is the amount of gas that we could reasonably expect to count on."

A We as estimators and appraisers, we are up against this same problem almost daily, and we proceed with the mechanics of making our estimates, and if an estimator is fair with himself in attempting to do the best job he can, he will be the best critic of this, and he should in each case criticize the material for their weaknesses and their strong points, and in cases he might want to raise his reserves arbitrarily, based solely on the judgment. Or he may want to discount them. And one of the things that I find helps very much in almost all of these cases is to place yourself in the position of recommending to a buyer what these reserves mean in terms of dollars. That is when your back is really against the wall, and you are really -- it is your real responsibility to come up with as substantial an answer as you can. Now, I am afraid all that does not help you very much, Dr. Govier, but, as you say, it all gets back to judgment.





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Q Well, if you are recommending to a client who is interested by a property, would you use what you felt was proven, or would you use what you felt was proven plus what you yourself thought was probable, or would it be somewhere in between, or would it vary from case to case? Surely you can go that far, Mr. Hawthorn?

A I would not probably even come up with such a classification.

Q Well, maybe we are getting somewhere now.

A If you had made that classification, then you would want to study each group, and the weaknesses and the strong points of each group, and you might find that your proved reserves were very sound and substantial, and you would not want to do a thing with them, that you would want to stand by them to the last ditch. On the other hand, you might look at your probable reserves and see that they were very weak, and the evidence supporting them was meagre, and you did not believe them and you might throw them all out.

Q Is there any possibility that you might, in attempting to establish the value of the property, figure the proved reserves at one Mcf. price and the probable reserves at some discount Mcf. price. Is that a practical approach?

A That is a practical approach, but I think you would probably reduce it to the equivalent Mcf. probably.

Q I see.

A And apply the same price in the ground.

Q The same price in the ground?

A Yes, sir. For instance, if gas in the ground were worth



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3 cents, and I was firmly of the opinion that my proved reserve estimate was good and sound, and I wanted to recommend to a client to spend his money on those grounds, I might do that, and then if we had a group of probable reserves, which I was very sketchy about, I might want to discount those down to 10 per cent maybe, or 50 per cent, it all depends on the judgment that you develop.

Q And in another case you might not want to discount it at all, is that it?

A Well, if they were in the classes of probable reserves, and when you had made that estimate, if they would be on sketchy information, and you were then projecting them further forward, your analysis further than for the proved reserves, in that case you certainly would not want to have the reliance on them that you would on your proved reserves, otherwise why divide them?

Q Well, that is why I have been asking that same question, why divide them if you are going to count them in the long run?

A I do not see why.

Q The point is that you would not count them the same in the long run?

A No, sir. If I have divided them it would have been on the same basis, of course.

Q Yes?

A For instance, down in our Gulf Coast fields that are so highly faulted, on one side of the field you may have closures against the fault, and your information was entirely complete, but you had drawn your structures





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and you had some indication that there was production across the fault, but there was nothing positive to go on, well, in one part of that fault you might have perfectly firm established reserves, and on the other side of the fault you would have reserves that would carry that degree of probability about them.

Q And I take it that, depending on the circumstances and detailed knowledge of the particular field, it might be a proper approach, or it would be a proper approach to attempt to assign some probability factor to the probable reserves in order to estimate the value of the property, is that fair?

A Oh, yes, I think that is entirely correct.

Q And you might get anywhere from 0 to 100 per cent?

A That is right.

Q Thank you, Doctor.

CROSS-EXAMINATION BY MR. BREDIN:

Q I wonder, sir, if I might just ask one question?

THE CHAIRMAN: Yes.

Q MR. BREDIN: Mr. Hawthorn, would it make any difference in your estimation of reserves who you were making the estimates for, say, a trust company that was interested in financing a pipeline based on reserves, or an oil company, say, which was simply interested in its potential reserves and had no immediate thought of utilizing those reserves, would your estimate of "probable" be a higher factor or of a higher percentage of discount



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for that trust company than for the oil company?

A Well, certainly the parties you are doing the work for are an important factor, and you might come up with different figure, but in each case they should receive your very best classification, and it would be a responsibility to advise your client of that. In many cases, you might be doing work for a client who was in the speculative end of the business and wanted to take chances. On the other hand, you might be doing the work for a trust company in which you wanted to expect the maximum degree of security and safety in your estimates.

Q It would be safe to say, then, that you would apply a higher discount factor for the trust company that wanted a conservative safe estimate?

A Well, I will put it another way. I do not know whether you would exactly go through that procedure of applying a factor or not but you would qualify your reserves in the light of the party that you were doing the work for.

Q Thank you very much.

MR. C.E. SMITH: Were you going to adjourn now, sir?

THE CHAIRMAN: Did you wish to ask a question of Mr. Hawthorn?

MR. C.E. SMITH: No, but I wanted to mention something about tomorrow, so that we might not get mixed up, before adjournment. It is the question of the agenda.

THE CHAIRMAN: We will hear Mr. Davis tomorrow. Mr. Steer could not be here today, and we arranged to have Mr. Davis put on the stand tomorrow morning.





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MR. DAVIS: Mr. Chairman, I would like to say to you that I have one of my geologists here, and I would like to have him on the stand for a short part of our statement, and I would like to have him on the stand either before or after I go on.

THE CHAIRMAN: Yes, that will be all right. Mr. Martland, have you any other evidence that you wish to put in?

MR. MARTLAND: Not at this stage of the proceedings. That completes it.

THE CHAIRMAN: We will hear from Mr. Davis and the geologist tomorrow morning. We would also like to hear from the Gulf Company, if they will be ready to go on tomorrow morning, and also the Hudson's Bay Oil and Gas Company.

MR. MEARS: The Canadian Gulf Company will be ready to go on tomorrow morning.

THE CHAIRMAN: We will adjourn until tomorrow morning then.

(The Hearing adjourned until 9:30 A.M.,  
Tuesday, October 2nd, 1951.)



Dr. J. H. ...  
Dr. J. H. ...

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Mr. Chairman, I would like to  
say that I have not yet received  
I would like to have him on the stand for a short part  
of our testimony, and I would like to have him on the  
stand either before or after I do so.

Yes, that is all right.  
Mr. Chairman, have you any other questions that you wish

Mr. Chairman, I have no more questions at the present  
time. That is all, thank you.

We will hear from Mr. Lewis  
and the engineer tomorrow morning. We would also like  
to hear from the Gulf company, if they will be ready to  
go on tomorrow morning, and also the witness for the  
oil company.

The Canadian Gulf company will  
be ready to go on tomorrow morning.

We will adjourn until tomorrow  
morning then.

(The hearing adjourned until 9:30 a.m.,  
Tuesday, October 2nd, 1931.)



# The Province of Alberta

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## PETROLEUM AND NATURAL GAS CONSERVATION BOARD

Application for Permission to Remove or cause to be removed  
Natural Gas from the Province of Alberta, under the Provisions of the  
Gas Resources Preservation Act by Prairie Pipe Lines Limited.

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I. N. McKinnon Esq., Chairman

D. P. Goodall Esq.

Dr. G. W. Govier

*Session:*

Volume\_\_\_\_\_



